



ಕರ್ನಾಟಕ ಕಲಾ, ವಿಜ್ಞಾನ ಹಾಗೂ ವಾಣಿಜ್ಯ ಮಹಾವಿದ್ಯಾಲಯ, ಬೀದರ

KARNATAK ARTS, SCIENCE & COMMERCE COLLEGE, BIDAR

Estd 1970

(Affiliated to Gulbarga University, Kalaburagi)

College with Potential for Excellence Status Awarded by UGC New Delhi

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3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five year

Sl. No.	Name of the teacher	Title of the book/chapters published/Paper	ISBN number of the proceeding
1	Dr. Somnath Mudda	Usage of Internet Access by Staff and Students of First Grade Colleges at Yadgir City	978-93-83403-04-2
2	Dr. B.S. Biradar		978-93-81718-40-7
3	Dr. Jagannath Hebbale	Janapada Hadugala Sangraha	978-93-81718-39-1
4	Dr. Jagannath Hebbale	Karnataka Grama Charitre Kosha- A Volume on Folk History of Karnataka Villages: Bidar District	978-93-83149-70-4
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USAGE OF INTERNET ACCESS BY STAFF AND STUDENTS OF FIRST GRADE COLLEGES AT YADAGIR CITY

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Abstract

The Internet is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link billions of devices worldwide. It is a network that consists of millions of private, public, academic, business and government networks of local to global scope, linked by a broad array of electronic, wireless and optical networking technologies. The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents and application of the World Wide Web (WWW), electronic mail, telephony and peer-to-peer networks for file sharing.

A well-structured questionnaire was distributed among the 90 teachers and students of the five colleges in the Yadagir city. Out of which 80 questionnaires were received back duly filled in. The response rate was 72 per cent. The study revealed that the level of student's access to the Internet was low and the major reason was that at the time of the study, computers with Internet facilities were inadequate. The findings also revealed that the rate of Internet use was more among the teachers and students of Commerce and Science faculty as compared to the faculty of Arts. However, majority of the students expressed their interest in the use of Internet and its resources and were enthusiastic in improving their skills in the use of the Internet. The study recommends the provision of more computers with Internet facilities, better access speed and providing more orientation/training programmes in the use of Internet in these institutions.

Keywords : Internet, Email, Network, Electronic, Telephone, Academic, Commerce, Arts and Science Colleges.

INTRODUCTION

In today's world internet has grown immensely over the years in this landscape, internet is considered as an affluent source of information. The potential impact of this technology on an academic and research scenario is not an exception, as it greatly affects the teaching and research environment in higher education system. In the present situation higher education is bound to opt for the unavoidable shift from culture of print to a culture of digital technology affects the teaching learning and research but also the whole of higher education.

The college libraries are currently largely committed to the use of electronic information resources, because they are required to provide high quality services to a large number of faculty and students. Who must access to information services which in practical terms can now only be provided with the aid

of electronic information resources. Users to know their level of awareness about available electronic information resources, which support their day today activities.

OBJECTIVES

The study was conducted with the following specific objectives

- To study the use of Internet by the teachers and students in the degree college under study.
- To identify the different purposes of using Internet by the academic community.
- To identify the constraints encountered by the respondents while using the Internet.
- To assess the satisfaction level of the Internet facilities provided by the under graduate colleges under study.
- To suggest ways of providing better Internet services to the users.

METHODOLOGY

The five under graduate colleges of Yadagir city having arts, commerce and science faculties were selected for the study and were visited personally by the investigator to collect data from the respondents. A total sample of 90, 55 teachers and 35 undergraduate students, was taken up for the study. For sampling, random sampling process was followed for data collection. The teachers and students were randomly selected, in equal proportion, from the science, humanities and commerce faculties. Out of 90 questionnaires, 80 were dully filled and returned accounting to 72 per cent. That data collected from the teachers and students was further computed and interpreted using simple statistical techniques like frequency, percentages as well as other statistical tools such as weighted mean and standard deviation to analyses the data.

SCOPE AND LIMITATIONS OF THE STUDY

The research study is confined to the colleges in the Yadagir city having permanent affiliation from the Gulbarga University all the combined of science, Arts and Commerce faculty. The following colleges were selected for the study :

1. Government First Grade College, Yadagir
2. Lingeri Konnappa Degree College, Yadagir
3. Jawahar Arts, Commerce, Science & B.C.A Degree College, Yadagir
4. Mahatma Gandhi Degree College, Yadagir
5. Chandrashekhar Degree of Arts, Science College, Yadagir

ANALYSIS

Characteristics of Study Population

Status	No. of respondents	Percentage	No. of male respondents	No. of female respondents
Teachers	50	62.5	30	20
Students	30	37.5	20	10
	80	100	50 (62.5)	30 (37.5)

Table 1 shows that more than one-third, 62.5 % of study population comprised teachers and 30 (37.5 percent) students. The respondents comprised 50 (62.5 percent) males and 30 (37.5 percent) females.

Internet Use

Table 2. Faculty-wise breakup of the respondents showing internet use

Faculty	No. of respondents using the Internet	No. of respondents not using the Internet	Total respondents
Arts	10 (16.12 %)	05 (27.77 %)	15 (18.75 %)
Commerce	20 (32.25 %)	05 (27.77 %)	25 (31.25 %)
Science	32 (51.61 %)	08 (44.44 %)	40 (50.00 %)
	62 (100)	18 (100)	80 (100)

Table 2 shows that of the total 80 respondents, 62 used Internet. To ascertain the Internet use by the teachers and the students, a faculty-wise breakup of the respondents is shown in table 2. It shows that fluctuation in the use of Internet among different faculties. Nearly half (27.77 percent) of the arts faculty did not use the Internet, while among the science faculty only 27.77 percent of the respondents were non-users of the Internet. Among the Internet users, it was found that 32.25 percent of the commerce faculty and 51.61 percent of the science faculty were Internet users while only 16.12 percent of the arts of faculties were Internet users. 18(22.5 percent) respondents, who were not using the Internet, were further queried to understand the reasons for their not using the Internet.

Table 3. Reasons for not using internet by the respondents

Reasons for not using	No. of responses	Percentage
No interest	5	27.77 %
Need training	2	11.11 %
Do not feel it necessary	2	11.11 %
No proper Internet facility in the institution	6	33.33 %
Other reasons (e.g. language problem, etc.)	3	16.66 %
Total	18	100 %

Table 3 shows that 22.5 percent of the respondents did not use the Internet because they needed training, 27.77 percent had no interest in using it whereas 33.33 percent were not using since the institution was not having proper Internet facility. Also, 11.11 percent of the respondents did not feel its necessity and 16.66 per cent had other reasons such as language-related problems, etc.

Table 4. Experience of Internet Use

Years	No. of responses	Percentage
0 - 6 Months	5	8.06 %
6 - 1 Year	12	19.35 %
1 - 2 Years	13	20.96 %
2 - 4 Years	16	20.80 %
4 and above years	16	20.80 %
Total	62	100 %

Table 4 shows that out of the 62 Internet users, 20.80 % of the respondents were using Internet for more than four years. Whereas 19.35 % percent of the academic community were using it for 1-2 years and 20.80 percent were using Internet for 2-4 years. Rests of the respondents were using it for less than a year. The analysis indicates that half of the respondents were using Internet on an average for more than 2 years.

Table 5. Frequency of Internet Use

Frequency of Internet Use	No. of responses	Percentage
Daily	15	24.19 %
2 - 3 times a week	20	32.25 %
2 - 3 times a month	20	32.25 %
Once in a month	05	08.06 %
Total	62	100 %

To access the frequency of using the Internet services, the time was classified into four different categories: daily, 2-3 times a week, 2-3 times a week and month and once in a month. It was found that 32.25 % percent used Internet 2-3 times a week and month, respectively and 24.19 percent of the academic community used it daily. The analysis clearly indicates that on an average majority of the respondents used Internet once in a week and month.

Table 6. Purpose of Internet Use

Purpose	Frequency	Percentage
Finding relevant information	60	96.77
Accessing online journals	53	85.48
E-mail	58	93.54
Research work	59	95.16
Searching Job Opportunity	43	69.35
General information	35	56.45
Social networking	43	69.35
E-books	44	70.96

Table 6 shows that different purposes for which the respondents used the Internet. Table 6 shows that 60 (96.77 percent) of the respondents used Internet to finding related information. 85.48 percent used for accessing online journals, 93.54 per cent for communication mainly through e-mail, 95.16 per cent for their research work and almost equal percentages (69.35 percent) and 42.2 percent) for searching jobs and social networking 70.96 percent for e-books it is encouraging to note that the respondents were making maximum use of the Internet and were of its benefits for educational purposes as well as other purposes.

Table 7. problems Encountered in Using Internet

Problems encountered while Internet Services	Frequency	Percentage
Slow Internet access speed	62	100
Too long to view / download	59	95.16
Electricity failure	57	91.93
Difficulty in finding relevant information	56	91.35
Limited number of computers	53	85.48
Important sites in subject area not known	55	88.70
Time slot insufficient	64	87.09
Internet connectivity always off	53	85.48
Poor computer using skills	52	83.87

The respondents were asked to state whether they faced any problems while using the Internet. It was observed that, 100 per cent encountered difficulties while using slow Internet access speed. In continuation of the query on whether they faced any problems in the use of the Internet.

CONCLUSION AND SUGGESTIONS

Based on the findings of the study, the following suggestions are recommended to improve the use of Internet among the teachers and the undergraduate students of the Yadagir city colleges :

- ❖ There is a need for extensive training programme organized at regular intervals so that all categories of users can improve their proficiency in the use of the Internet.
- ❖ The Internet and allied technologies should be included in the curriculum.
- ❖ More computers with latest specifications are required in the library as well as the computer centre.
- ❖ To solve the slow downloading problem, the colleges should acquire high speed Internet connection with maximum bandwidth.
- ❖ Information regarding the popular and the latest websites with their addresses should be displayed on the notice board in the library and in the computer centre.
- ❖ Printing facility should be provided so that the users can get printout of their study materials and other important documents.
- ❖ The Internet facility should be familiarized to all.

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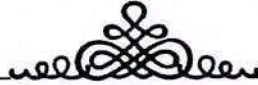
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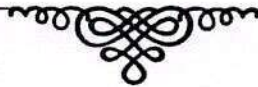
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: ಡಾ. ಜಗನ್ನಾಥ ಹೆಬ್ಬಾಳೆ

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ವಿಧಿಕ್ರಿಯೆ ಮತ್ತು ಆಚರಣೆಗಳು

- ಡಾ. ಜಗನ್ನಾಥ ಹೆಬ್ಬಾಳೆ

ಸಂಯೋಜನಾಧಿಕಾರಿಗಳು,

ಕರ್ನಾಟಕ ಜಾನಪದ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಪ್ರಾದೇಶಿಕ ಅಧ್ಯಯನ ಕೇಂದ್ರ, ಬೀದರ

ಜನಪದ ಹಾಡುಗಳಲ್ಲಿ ಸತ್ತವರ ಹಾಡು ಒಂದು ಪ್ರಕಾರ, ಆಂಗ್ಲದಲ್ಲಿ Dirge Song ಮತ್ತು Sorrow Song ಎನ್ನುತ್ತಾರೆ. ಸಾರೋ ಮತ್ತು ಡರ್ಜ್ ಪದದ ಅರ್ಥ ಶೋಕ, ಗೋಳು ಮತ್ತು ದುಃಖ ಎಂದಾಗಿದೆ. ಒಬ್ಬ ವ್ಯಕ್ತಿ ಸತ್ತಾಗ ಅವನ ಸಂಬಂಧಿಕರು ಸ್ನೇಹಿತರು ಹೆಣೆದ ಮೇಲೆ ಬಿದ್ದು ಎದೆ ಗುದ್ದಿಕೊಳ್ಳುತ್ತ, ಹೊರಳಾಡುತ್ತ, ಚೀರುತ್ತ, ಬೊಬ್ಬೆ ಹೊಡೆಯುತ್ತ, ತಮ್ಮ ದುಃಖ ಶೋಕ ಲಯಬದ್ಧವಾಗಿ ಹೊರಹಾಕುವುದೇ 'ಸತ್ತವರ ಹಾಡು'. ದುಃಖದ ಆವೇಶ ಹೆಚ್ಚಾದರೂ ರಾಗಲಾಪ ಮಾಡುತ್ತ ಲಯಬದ್ಧವಾಗಿ ಹಾಡುತ್ತಾರೆ. ಹೆಣೆದ ಸುತ್ತಮುತ್ತ ಕುಳಿತು ನೋಣ ಜಾಡಿಸುತ್ತ, ಅಳುತ್ತಾ, ಹಾಡು ಹೇಳುತ್ತಾರೆ. ಸತ್ತವರ ಸೇವೆ ಸಾಧನೆ ಉಪಕಾರ ನೆನಪು ಮಾಡಿಕೊಂಡು ಶೋಕ ವ್ಯಕ್ತಪಡಿಸುತ್ತಾರೆ. ಬದುಕಿದ್ದಾಗ ಕೆಟ್ಟ ಕೆಲಸ ಮಾಡಿದವನಿದ್ದರೂ ಸತ್ತಮೇಲೆ ಹೊಗಳುವ ಪದ್ಧತಿ ಅನುಸರಿಸುತ್ತಾರೆ. ಸಾವು ಪ್ರತಿಯೊಬ್ಬನಿಗೆ ಕೊನೆಯ ಘಟ್ಟ ತೆಗಳುವುದರಿಂದ ಏನೂ ಪ್ರಯೋಜನವಿಲ್ಲವೆನ್ನುವ ಮನೋಭಾವ ಜನಪದರದಾಗಿದೆ.

ಸತ್ತವರ ಹಾಡು ಹೃದಯದ ತಳಮಳ ಆಕ್ರೋಶ, ನೋವು, ನಿರಾಶೆ ಮತ್ತು ಚಿಂತೆಯಿಂದ ತುಂಬಿಕೊಂಡಿದೆ. ಉಪಮೆ ಗಾದೆಗಳಂತೂ ಹಾಡಿನ ಮೇಟಿಯಾಗಿವೆ. ಈ ಹಾಡುಗಳು ಬಹು ಪ್ರಾಚೀನ ಕಾಲದಿಂದ ಬೆಳೆದುಬಂದಿವೆ ಎಂಬುದಕ್ಕೆ ಅನೇಕ ದಂತ ಕಥೆಗಳಿವೆ. ಶೋಕ ಗೀತೆಗಳ ರಚನೆ ಕಾರ್ಯಕ್ರಮ. 3ನೇ ಶತಮಾನದಲ್ಲಿ ಪ್ರಾರಂಭವಾಗಿದ್ದಕ್ಕೆ ಅನೇಕ ಆಧಾರಗಳಿವೆ. ಗ್ರೀಕ ಕವಿ ಥಿಯೋಕ್ರಿಟಿಸ್ ರಚಿಸಿದ 'ಸತ್ತು ಹೋದ ಕುರುಬ' ನೊಬ್ಬನ ನೆನಪಿಗಾಗಿ ಎಂಬುದು ಅತ್ಯಂತ ಪ್ರಾಚೀನ ಶೋಕಗೀತೆಯಾಗಿದೆ. 1586 ರಲ್ಲಿ ಇಂಗ್ಲಿಷ್ ಕವಿಗಳಲ್ಲಿ ಮಿಲ್ಟನ್, ಷೆಲ್ಲಿ, ಗಣ್ಯರು. ವಿಶ್ವಸಾಹಿತ್ಯದಲ್ಲಿ ಗೌರವದ ಸ್ಥಾನವನ್ನು ಗಳಿಸಿಕೊಂಡಿರುವಂಥದು ಆಂಗ್ಲ ಕವಿ ಥಾಮಸ್ ಗ್ರೇ ರಚಿಸಿದ 'ಗ್ರಾಮ' ಸ್ಮಶಾನದಲ್ಲಿ ಬರೆದ ಶೋಕಗೀತೆ ಎನ್ನಲಾಗಿದೆ.

ಕನ್ನಡದಲ್ಲಿ ದಿ. ಬೇಂದ್ರೆ ಕವಿ ಬರೆದ (1946) 'ಹಾಡು ಪಾಡು' ಸಂಕಲನದಲ್ಲಿ ಉತ್ತಮ ಶೋಕಗೀತೆಗಳಿವೆ. ಪಂಜೆ ಮಂಗೇಶರಾಯರ ಸಹೋದರ ಸತ್ತ ಮೇಲೆ ತನ್ನ ದುಃಖದ ಆತುರದಿಂದಾಗಿ 'ಅಣ್ಣನ ವಿಲಾಸ' ಎನ್ನುವ ಹಾಡು ರಚಿಸಿದ್ದಾರೆ. ಟಿ.ಎಸ್. ವೆಂಕಣ್ಣಯ್ಯನವರು ಗತಿಸಿದಾಗ ರಾಷ್ಟ್ರಕವಿ ಕುವೆಂಪು ಅವರು ದುಃಖದಲ್ಲಿ ಮುಳುಗಿ,

"ಬೆಂದ ನೆಲದಿಂದೊಡನೆ ಹೊಸ ಹಸಿರು ಹೊಮ್ಮುವುದೇ?
ಹಸಿ ನೋವಿನಿಂದೆ ಹಾಡಿನ ಚಿಲುಮೆ ಚಿಮ್ಮುವುದೇ?
ಮೌನವೇ ಮಹಾಸ್ತುತಿ ನಿಮಗೆ ನೀರವ ವ್ಯಕ್ತಿ

ಅನೇಕ ಶೋಕ ಗೀತೆಗಳು ಅಲ್ಲಿ-ಇಲ್ಲಿ ಬಿಡಿಬಿಡಿಯಾಗಿ ದೊರೆತರೂ, ಅವು ವೈಯಕ್ತಿಕ ಭಾವನೆಯ ಗುಡುಗುಗಳಾಗಿವೆ. ಕರುಳು ಕತ್ತರಿಸುವ ಖಡ್ಗದಂತಿವೆ. ಗುಡುಗಿನಂತೆ ಗುಡುಗುವ ಕಾರ್ಮೋಡದಂತಿವೆ. ನೋವು ನಿರಾಶೆಯ ಬಿಸಿಲಿನಂತಿವೆ.

ಜನಪದರ ಸತ್ತವರ ಹಾಡುಗಳು ವಿವಿಧ ಅವಸ್ಥೆಯನ್ನು ಪಡೆದುಕೊಂಡಿವೆ. ಮುಸ್ಲಿಂ ಜನಾಂಗದ ವ್ಯಕ್ತಿ ಸತ್ತಾಗ ಮನೆಯಲ್ಲಿಯೇ ಅಳುವ ಪದ್ಧತಿ ಇದೆ. ಇತರ ವರ್ಗದ ವ್ಯಕ್ತಿ ಸತ್ತಾಗ ಮನೆಯಿಂದ ಕುಣಿವರೆಗೆ ಅಳುವುದೇ ಹೆಚ್ಚು ಇಂಥ ಸಮಯದಲ್ಲಿ ಹೆಣ್ಣು ಮಕ್ಕಳ ಪಾತ್ರ ಪ್ರಮುಖವಾಗಿರುತ್ತದೆ. ಒಟ್ಟಿನಲ್ಲಿ ಚಿಂತೆ-ದುಃಖದ ಭಾರ ಇಳಿಸಿಕೊಳ್ಳುವ ದೃಷ್ಟಿಯಿಂದ ಸತ್ತ ಮೇಲೆ ಅಳುವ ಪದ್ಧತಿ ಇನ್ನು ಹಳ್ಳಿಗಳಲ್ಲಿ ಹಸಿರಾಗಿದೆ. ನಗರ ಪಟ್ಟಣಗಳಲ್ಲಿ ಕೊಂಚ ಕಡಿಮೆಯಾಗಿದೆ.

ದೇವ ದೇವತೆಗಳನ್ನು ಬಿಟ್ಟರೆ ಜಗತ್ತಿನಲ್ಲಿರುವ ಪ್ರತಿಯೊಂದು ಜೀವರಾಶಿಗೂ ಹುಟ್ಟು ಸಾವು ಇದ್ದೇ ಇದೆ. ಹುಟ್ಟಿದ ಪ್ರತಿಯೊಂದು ಜೀವಪ್ರಾಣಿ ಸಾಯಲೇಬೇಕು. ಮನುಷ್ಯನಾಗಿ ಹುಟ್ಟಿದ ನಂತರ ಕೆಲವು ವಿಧಿ-ವಿಧಾನಗಳು ಇರುವಂತೆ, ಸತ್ತ ಮೇಲೂ ಕೆಲವು ಶವ ಸಂಸ್ಕಾರ ನೆರವೇರಿಸುವ ಪದ್ಧತಿಗಳು ಇವೆ. ಒಬ್ಬ ವ್ಯಕ್ತಿ ಸತ್ತಾಗ ಶವಸಂಸ್ಕಾರದ ಕ್ರಿಯೆಗಳು ಈ ಮುಂದಿನಂತೆ ಸಾಮಾನ್ಯ ಸ್ವರೂಪ ಪಡೆಯುತ್ತವೆ. ಸತ್ತವನ ಹೆಣ ನಡು ಮನೆಯಲ್ಲಿ (ಕೈಕಾಲುಗಳನ್ನು ಮುಡುಚಿ) ಮಲಗಿಸಿ ಸುತ್ತಮುತ್ತ ಕುಳಿತು ನೋಣ ಜಾಡಿಸುತ್ತಾ ಅಳುತ್ತಾರೆ. ಆ ದಿನ ಸತ್ತವನ ಹಾಗೂ ಅಕ್ಕಪಕ್ಕದ ಮನೆಯವರು (ಹೆಣ ಹೋಗುವವರೆಗೆ) ಒಲೆ ಹಚ್ಚುವುದಿಲ್ಲ. ಸತ್ತ ಹೆಣದ ಮುಂದೆ ಈ ಮುಂದಿನವೂ ಸೇರಿಕೊಳ್ಳುತ್ತವೆ. ಭಾವಾತಿರೇಕದಿಂದ ಚಿತ್ತಶೂನ್ಯವಾಗುವುದು, ತಲೆಗೂದಲು ಚೆಲ್ಲಾಪಿಲ್ಲಿಯಾಗುವುದು, ಮುಖ ಬಡಿದುಕೊಳ್ಳುವುದು, ಕಾಲು ಬಡೆಯುವುದು, ಕೊರಳಿಗೆ-ಕೊರಳಾಕಿ ಅಳುವುದು, ಧೂಳು ಮಣ್ಣಿನಲ್ಲಿ ಹೊರಳಾಡುವುದು ಅಥವಾ ತಲೆಮೇಲೆ ಹಾಕಿಕೊಳ್ಳುವುದರ ಜೊತೆಗೆ,

ಅಯ್ಯೋ! ನನ ದೇವ್ರೆ ನಿಮಗೇನು ಬಂದಿತಪ್ಪಾ
ಆ ದೇವ್ರೆ ನಿನಗೆ ಯಾಕ ಕರಕೊಂಡ ಹಾವ್ದಪ್ಪಾ
ನಮಗಿನ್ಯಾರಪ್ಪಾ ದೇವ್ರೆ
ನಮ್ಮ ಬಾಯಿಗೆ ಮಣ್ಣು ಹಾಕಿದ್ದಲ್ಲೋಪ್ಪಾ
ಮುತ್ತಿನಂಥ ಹೆಂಡ್ಡಿ ಮಕ್ಕಿಗೆ ಬಿಟ್ಟು ನಡದಲ್ಲಪ್ಪಾ
ನಮಗೆ ಯಾರಾದ್ರೂ ಏನಾದ್ರೂ ಅಂದ್ರೆ ಆಡಿದ್ದೆ
ಒಣಕಿ ತಗೊಂಡ ಹೊಡೆತ್ತಿದ್ದಿಲ್ಲಪ್ಪಾ

ಜಗಜ್ಯೋತಿ

(ಬಸವ ಉತ್ಸವ-೨೦೧೮ರ ಸ್ಮರಣ ಸಂಪುಟ)



ಗೌರವ ಸಂಪಾದಕರು

ಶ್ರೀ ಈಶ್ವರ ಖಂಡ್ರೆ

ಮಾನ್ಯ ಪೌರಾಡಳಿತ ಮತ್ತು ಸಾರ್ವಜನಿಕ ಉದ್ಯಮಗಳ
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ಪ್ರಧಾನ ಸಂಪಾದಕರು

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ಸಂಪಾದಕರು

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ಅಧ್ಯಕ್ಷರು, ಕರ್ನಾಟಕ ಜಾನಪದ ಪರಿಷತ್, ಬೀದರ



ಪ್ರಕಾಶಕರು

ಬಸವ ಉತ್ಸವ ಸಮಿತಿ

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Old Handwritten Music Symbol Recognition using the Combination of Foreground and Background Projection Profiles

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Abstract— Optical music symbol recognition got huge attention during the last decade, lot of works have been reported for printed music symbol recognition, but very limited works have been reported for old handwritten music symbol recognition. Degradation due to aging, noise, change in handwriting styles and size makes this problem more challenging and difficult. In this paper, we have attempted the problem of old handwritten music symbol recognition. To do this, we applied three basic steps such as pre-processing, feature extraction, and classification. In pre-processing, each isolated character is resized to the size of 64x64. The projection profiles are computed from foreground as well as from background in feature extraction. The task of classification is carried out using simple k-NN classifier. Promising results were achieved with the accuracy of 95.72%.

Keywords- Foreground Projection Profiles, Background Projection Profiles, Optical Music Symbol Recognition, k-NN Classifier, Cross Validation.

I. INTRODUCTION

This is the generation of advanced information technology, where computer systems are capable of automatically reading the music sheet and play the required music. This can be done with the help of Optical Music Symbol Recognition (OMR). Because of rapid development of computer hardware and the Internet, the electronic version of sheet music is becoming more popular as it can be conveniently shared and played. There are currently several commercial and open source software programs which can perform sheet music recognition. However, they are neither very reliable nor very effective for handwritten music score notation, especially for old handwritten symbols which are degraded and mutilated in nature. Music symbol recognition will be of two types; one is the online method and the other is offline method. In this paper, we have worked on offline handwritten symbol recognition. In offline method, music sheet is first scanned and then preprocessed with the help of binarization methods. These images are used for feature extraction and then classifiers are applied to recognize the music symbols. The recognition accuracy of handwritten music scores is low compared with printed music symbols. This is because of some issues such as symbols skew/slant, variation in writing styles; at the same time size and degradation make the handwritten music symbol recognition problem more complex. This paper aims to contributing a robust algorithm for the recognition of old

handwritten music symbols by using foreground and background based features.

The remainder of the paper is organized as follows: Related work is reviewed briefly in Section II and in section III, proposed methodology is described. The experimental results and conclusion are presented in Section IV and V respectively.

II. RELATED WORK

During the last decade, important studies have been undertaken on optical music symbol recognition; in this section we have presented them briefly. Florence Rossant et al., [1] proposed an OMR based on fuzzy modeling to extract the information from the scanned music symbols and music rules. They conducted test on a hundred music sheets resulting in a global recognition rate of 98.55%. Sukalpa Chanda et al., [3] compared feature extraction methods for offline isolated musical symbol recognition. Texture-analysis and shape-descriptor features are compared. They compared SVM with MQDF classifier and achieved a higher accuracy for MQDF classifier with 98.09% whereas SVM accuracy rate is 97.50%. Hidetoshi Miyao and Minoru Maruyam [5] produced a system that recognizes the music symbols, which are written with a pen based computer on a music sheet. To do this, they followed two methods first one is time series data and image of handwritten stroke and the second one is combined strokes. They achieved an accuracy of 97.60% and 98.80% for strokes and music symbols respectively. Annau Bar'o-Mas ., [6] worked on both online and offline methods for recognition of music symbols, their dataset consist of compound and isolated symbols. Isolated symbols were recognized with symbol recognition methods such as blurred shaped model and compound music symbols were recognized with the help of primitive hierarchy and synthetic rules. The dataset used is CVC-MUSICMA and compares with commercial OMR software. In recognition of isolated music notes, symbol descriptors are Zoning and BSM and KNN classifier is used. Zoning is useful for printed music sheet, whereas for compound music symbol recognition, graphic primitives such as vertical line detection and beam detection are used in pre processing steps, staff lines are removed with staff line methods, braces are removed with staff line estimation method and long ties are removed by analyzing aspect ratio of the horizontal long connected component. After that, segmentation is done by considering vertical projection of

the image. Jiyong et al., [4] proposed an OMR that works on handwritten music symbols online recognition, which is a combination of strokes and music symbols. They classified the symbols and the strokes using stroke classification that uses three features, namely the information of the size of music symbols, histogram of undirected movement angles and histogram of directed movement angles. They worked on HOMUS database and achieved significant improvements of about 10% in recognition rates compared with the state-of-the-art method for the datasets. Laurent Pugin et al., [2] presented a novel comparison of GAMERA and ARUSPIX. In this study, they evaluated pitch determination process and core recognition system separately. They worked on both handwritten and printed music score, and compared all the classifiers on the dataset, and got an accuracy of 79%, 95%, 97%, 81% for printed score 77%, 92%, 94% and 69% for handwritten music scores, the classifiers used were NN, Nearest Neighbor, SVM and HMM respectively. Alicia Fornes et al., [7] worked on recognition of old handwritten music scores which are from 17-19 century. They classified the music symbols by a Dynamic Time Warping (DTW) based method. They realized that Zernike moments and Zoning art is not suitable for handwritten music scores, which means they got low accuracy rate by using these methods as compared with DTW. First, they worked on Clef symbols and got an accuracy of 95.81% whereas by Zernike moments they got only of 65% and later they worked on Accidentals (sharps, naturals, flats & double sharps) as a result they got an accuracy of 89.55% compared with Zernike moments of 43.97%. Sangkuk lee et al., [8] proposed a method using deep convolution NN for handwritten music scores classification. They used CNN instead of MLP. They rearranged the HOMUS Dataset by changing shape [square, thin fat] by increasing the number of nodes different size of kernels have been used and got an accuracy of 79%. Whereas with MLP classifier they got an accuracy of 62%. In this paper, we focused on the recognition of old handwritten music symbols; for effective representation of symbols, we have used a combination of foreground and background based projection profiles, with the help of basic k-NN classifier we have shown discriminating efficacy proposed features.

III. PROPOSED METHOD

As we aimed to recognize old handwritten music symbols, we have attempted this task in three basic steps of pattern recognition technology such as pre-processing, feature extraction, and classification. Firstly, music symbols are resized to the size of 64 x 64, foreground and background projection profiles are considered as features. A basic classifier K-NN was chosen to recognize the handwritten music symbols instead of using other sophisticated classifiers, to realize the effectiveness of the proposed features in discriminating the music symbols. Work flow of our method is presented in Fig.1.

A. Preprocessing

Preprocessing has significant impact on feature extraction and

these steps vary according to the applications. Here, music symbols are resized to the size of 64 x 64. For visual understanding, we have shown pre-processing of handwritten music symbol in Fig 2.

B. Feature extraction

Extraction of information in the form of features is an important component of any pattern recognition system. Feature extraction involves the identification of appropriate measures to characterize the component images distinctly.

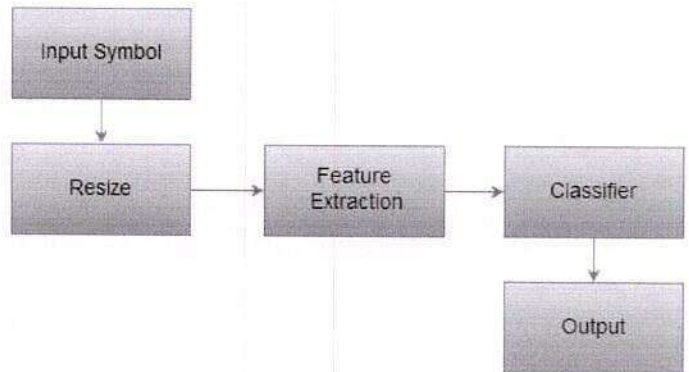


Fig. 1. Work flow of proposed method

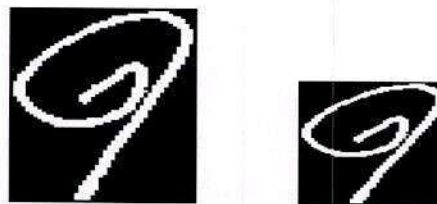


Fig. 2. (a) Input symbol (b) Input symbol resized to 64x64

Human visual system analyses the image as texture and it considers foreground as well as background, from this clue, in feature extraction technique, we have used the foreground and background profiles of image. To extract the profile features, first we have resized the input image to the size of 64x64, the size is selected experimentally. The foreground and background information of music symbols is used to compute horizontal and vertical projection profiles. In addition to this, we have computed foreground to background projection profile ratio and vice versa. For input image, foreground pixels are represented as (i,j) and off pixels are represented as (i',j'). For better understanding, we have shown the mathematical equations for the computation of features as below:

Foreground Horizontal Profile: row-wise sum of on pixel in an image is called foreground horizontal profile

$$\sum_{i=1}^{64} I(i, j) \dots \dots \dots (1)$$

Foreground Vertical Profile: column-wise sum of on pixel in an image is called foreground vertical profile.

$$\sum_{j=1}^{64} I(i, j) \dots \dots \dots (2)$$

Background Vertical profile: column-wise sum of off pixel in an image is called Background Vertical profile.

$$\sum_{j'=1}^{64} I(i', j') \dots\dots\dots (3)$$

Background Horizontal profile: row-wise sum of on pixel in an image is called background horizontal profile.

$$\sum_{i'=1}^{64} I(i', j') \dots\dots\dots (4)$$

Ratio of Foreground to Background vertical profiles:

$$\sum_{j=1}^{64} I(i, j) / \sum_{j'=1}^{64} I(i', j') \dots\dots\dots (5)$$

Ratio of Foreground to Background horizontal profiles:

$$\sum_{i=1}^{64} I(i, j) / \sum_{i'=1}^{64} I(i', j') \dots\dots\dots (6)$$

In this way, from each handwritten music symbol we have computed fixed size feature vector of (Foreground vertical and Horizontal profiles (64+64), Back ground vertical and horizontal profiles (64+64) and projection profiles ratios (2) as single value given in equation 5 and 6 respectively) 258 dimensions comprising above said foreground and background profile features.

C. Classification

KNN is the basic and simple classifier K-nearest neighbor is also taken into account. It classifies the data based on majority voting among its nearest neighbors. The nearest neighbor can be searched using suitable distance measure. In this work, we use value of K=3 which is fixed experimentally and City Block distance as distance measure to find nearest neighbor. Let P (p1,p2 ,p3..... pn) be the training data and Q (q1 ,q2 ,q3..... qn) be the testing sample. City block distance between P and Q is defined as follows:

$$D(P, Q) = \sum_{i=1}^n \|p_i - q_i\| \dots\dots\dots (7)$$

IV. EXPERIMENTS

A. Dataset and Evaluation Protocol

To evaluate and exhibit the performance of proposed method, we have used the dataset of Isolated Old Handwritten Music Symbols from [7] , it consists of total seven classes having four accidental and three clef symbol types , it comprises total of 2128 clefs and 1970 accidentals. Sample images from dataset are shown in Fig. 3. The training and testing tests are automatically divided with the 10 fold cross validation to evaluate the performance of our proposed method, this data is split into 10 equal sized sub parts, one part is used for validation and the remaining nine parts are used for training. This process is repeated for all seven classes and single value

result is calculated by averaging all results. We have defined the accuracy for each musical symbol as follows:

$$Accuracy = \frac{\# \text{ correctly classified symbols in class}}{\# \text{ total symbols in class}} \times 100$$

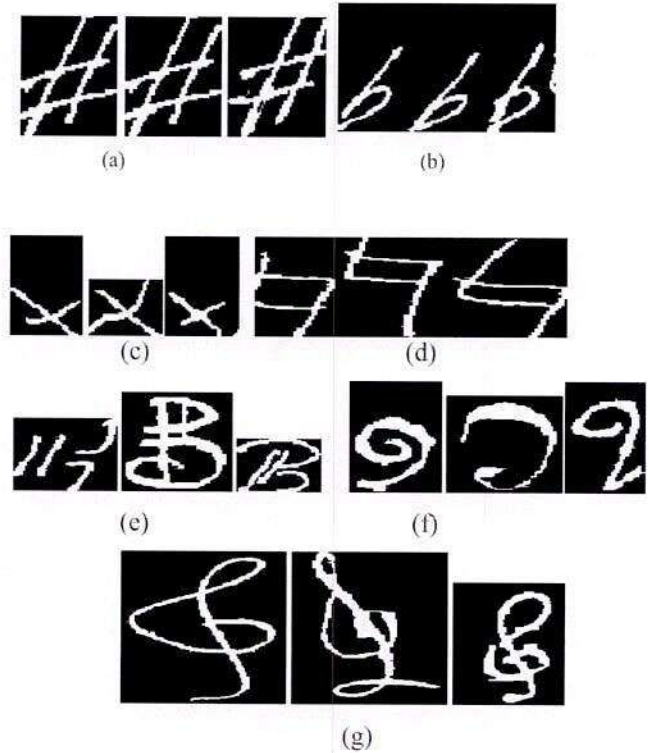


Fig. 3. (A) Accidental Sharp (B) Accidental Flat (C) Accidental Double Sharp (D) Accidental Natural (E) Clef Bass (F) Clef Alto (G) Clef Treble

TABLE I. CLASSWISE RECOGNITION ACCURACY OF MUSICAL SYMBOLS

Class No	Class of Music Symbol	Recognition Accuracy
1	Accidental Double Sharp	97.38 %
2	Accidental Flat	97.49 %
3	Accidental Natural	95.50 %
4	Accidental Sharp	80.29 %
5	Clef Alto	96.32 %
6	Clef Bass	98.72 %
7	Clef Treble	99.26 %

TABLE II. CONFUSION MATRIX

Class No.	1	2	3	4	5	6	7
1	505	8	1	0	2	0	1
2	3	485	3	0	2	2	2
3	5	9	451	0	0	3	3
4	0	2	2	544	0	0	1
5	1	18	0	2	733	1	4
6	9	45	32	0	2	387	6
7	0	2	2	0	2	0	814

B. Results and Discussion

To classify the old handwritten music symbols, we have used k-NN classifier with value of $k=3$ and city block distance measure. The performance of proposed method is evaluated with 10 fold cross validation as mentioned above. We have considered total seven classes of musical symbols: four accidental and three clefs. Class-wise recognition accuracy for each musical symbol is shown in Table 1. The highest accuracy of 99.26% is noted for clef treble and the lowest accuracy of 80.20% is noted for accidental sharp. For deeper analysis we have shown confusion matrix in Table 2. In Table 3, we have compared our work with earlier work reported on the same dataset with Dynamic time warping (DTW) method [7]. They received the results of 89.55% and our proposed method outperformed with the accuracy of 95.72% for all seven classes.

TABLE III. COMPARISON WITH SIMILAR WORK

Method	DTW [7]	Proposed method
Accuracy	89.55 %	95.72%

V. CONCLUSION

In this paper, we have presented a method to classify old handwritten music symbols. This work utilizes Human Visual System based clue that is the combination of foreground and background information used to discriminate patterns. To extract foreground and background based features conventional projection profiles are considered and the efficacy of these features is tested with simple k-NN classifier with city block distance. Experimental results have shown promising accuracy in the classification of old handwritten musical symbols. In future, we will extend our study to variety of musical symbols with other sophisticated classifiers.

ACKNOWLEDGEMENTS

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Radon and Wavelet Transforms for Handwritten Script Identification

C. Veershetty, Rajmohan Pardeshi, Mallikarjun Hangarge and Chitra Dhawale

Abstract Recognition of multi-script documents, both printed and handwritten, is still a challenge due to the script dependence of OCR. Identification of script is a significant process in design of multi-script OCR system for processing of multi-script documents. In this paper, we focus on wordwise script identification, as without surprise we can see many scripts mixed in single line. We present a method, which mainly comprises three steps—word extraction, feature computation, and classification. Using morphological dilation, words are extracted. Radon and wavelet transforms are employed to extract the features based on directional and multi-resolution analysis. In classification, performance of LDA, SVM, and KNN classifiers is studied separately. Experiments with our dataset of Kannada and Roman words show that the presented method is robust for wordwise handwritten script identification.

Keywords Radon transform · Discrete wavelet transform · Handwritten script identification · Kannada and roman scripts

1 Introduction

1.1 Motivation

The world is becoming automated and multilingual with the advancement of digital technologies. Digital solutions providing easy storage, access, and retrieval of

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information which stored digitally. During the three decades journey, document processing system like optical character recognition has achieved considerable success. Nowadays, easily we can process printed and handwritten document either in off-line or online mode, thanks to OCR. Unfortunately, OCR is limited to known script and fails with multi-script documents. Hence, in design of multi-script OCR system, script identification becomes essential. Here, we focus on wordwise off-line handwritten script identification. It can be noted that script identification in handwritten documents, specifically in Indian documents, becomes more difficult because of variation in style of writing, size, unconstrained nature, and inconsistent gap in lines, words, and character.

In this paper, we have presented efficient use of radon and wavelet transforms to derive directional multi-resolution features for wordwise off-line handwritten script identification. Effectiveness of our method is realized on Kannada and Roman scripts.

1.2 Related Work

Script identification considered as significant problem in the domain of document image analysis and has been received great focus over last three decades. Many interesting algorithms are reported in the literature for script identification. In [1] authors presented cluster-based template matching of textual symbols extracted from document images. Gabor filter and wavelet co-occurrence-based statistical texture features are considered to describe the script in [2, 6] respectively. Structural properties of script line such as projection profile, water reservoir, run length of pixels are considered in [3–5] for line-level script identification, while orientation-based features are reported in [5]. Well-known feature extraction techniques such as discrete cosine transform and Gabor filter-based statistical features are given in [7] for script identification in printed documents at word level. In [9] authors used moment-based features to identify handwritten script in Devanagari, Roman, and Arabic documents. The task on Roman and Persian script identification is accomplished by [10] with the help of fractal dimensions and topology-based structural features. In [8] attempt is made to identify Roman–Devanagari and Roman–Bangla bilingual handwritten documents at word level. Authors have used horizontalness, foreground–background transition, and script-specific features such as ‘Matra’ (present in Devanagari and Bangla scripts). In recent [11] reported directional discrete cosine transforms and [12] presented use of DCT, Gabor filter, and wavelet features for handwritten script identification at word level.

From our quick review on script identification, we noted that script identification is application dependent and can be carried out at different levels, viz. document Level [1, 2, 6], line level [3–5], and word level [7–12]. Most of the work is done with printed documents; details are presented in [17]. Few gives attention toward handwritten script identification at word level [8–12]. In this paper, we made an

attempt for wordwise handwritten script identification. We presented the features based on radon and wavelet transforms.

1.3 Structure of the Paper

The paper is organized as follows. We discussed our motivation and rich state of the art in Sect. 1. Details of proposed method are described in Sect. 2; it comprises preprocessing, feature computation, and classification, respectively. Experiment and results, with comparison to earlier works, are reported in Sect. 3. We concluded in Sect. 4 with our future perspectives.

2 Proposed Method

Our goal is to develop a method to identify the script of Kannada and Roman handwritten words. To identify the script of words, firstly we extracted the words from input document. To extract the features, we take advantage of radon and wavelet transforms, which avail us directional multi-resolution features. At classification stage, we employed LDA, SVM, and KNN separately and observed the performance. One can understand the proposed approach more better via Fig. 1

2.1 Preprocessing

To binarize input document image, we have applied simple gray-level threshold selection method described in [14]. Morphological opening is employed to remove the noise and small components such as dot and comma. Dilation is applied with line structuring element horizontally and vertically, which makes each word as connected component. To extract the word, basic connected component rule is employed. It

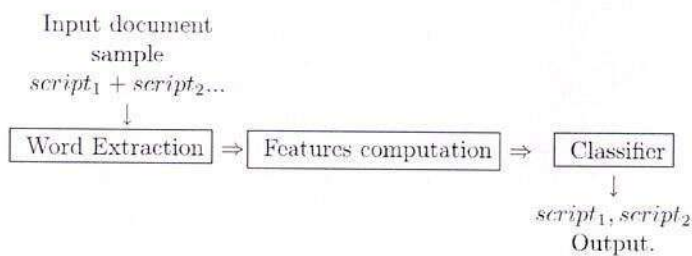


Fig. 1 Schematic diagram of complete work flow

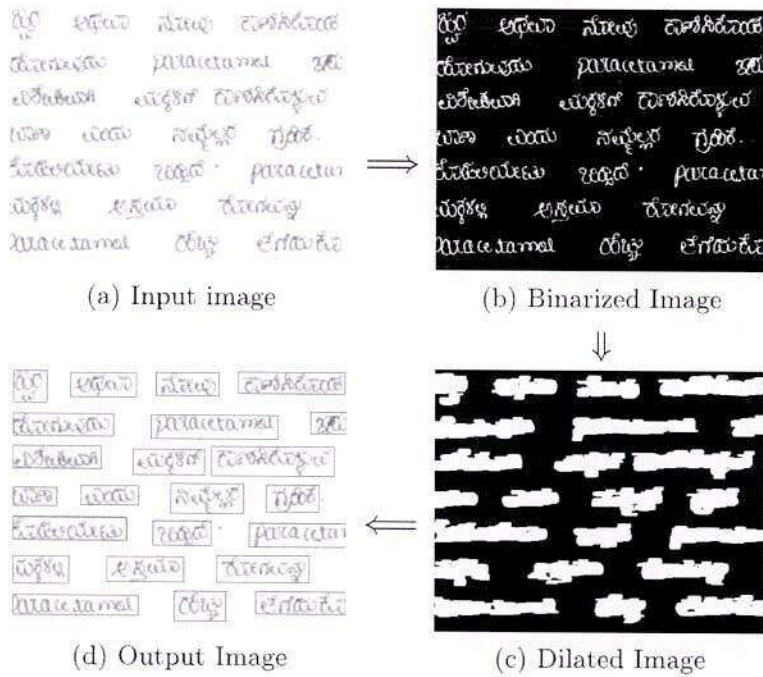


Fig. 2 An example showing word segmentation

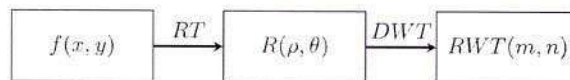
can be noted that this process of word segmentation suffers with touching lines and words. Preliminary work can have from [13]. For better understanding, we have shown bounding boxes to all words from sample document in Fig. 2

2.2 Feature Extraction

In the presented technique, the features are directional multi-resolution information of words. It's successful application for face recognition can be detailed from [15]. These features are derived from discrete wavelet transform (DWT) of global radon projections of word image. For better understanding, we have shown Fig. 3.

Radon transform is a frequency-based technique, it represents collection of projections at various directions. Set of line integrals of input image $f(x, y)$ gives a projection. In the defined direction, radon transform computes the line integrals from multiple sources along parallel paths and later the sum of directional energy of the

Fig. 3 Block diagram of feature extraction process



pixels, which is line integral $R(\rho, \theta)$, given by:

$$\rho = x \cos \theta + y \sin \theta \quad (1)$$

Radon transform of image $f(x, y)$ can be given as follows:

$$R(\rho, \theta) = \int_{-\infty}^{+\infty} \int_{-\infty}^{+\infty} f(x, y) \delta(x \cos \theta + y \sin \theta - \rho) dx dy \quad (2)$$

where δ is Dirac delta function,

$$\delta(x) = \begin{cases} 1 & \text{if } x = 0 \\ 0 & \text{otherwise} \end{cases}$$

To extract the directional energy and multi-resolution information of word images, given, $R(\rho, \theta)$. the global radon projections of word image. Then we applied discrete wavelet transform on global radon projections of word; in our work we consider (Daubechies-9) wavelets. we get:

$$RWT(m, n) = DWT(R(\rho, \theta)) \quad (3)$$

After applying DWT, radon projection energy is encoded in four ways, horizontal, vertical, diagonal in these directions and approximation of it. We called it as *RWT* coefficients. To perform the multi-resolution analysis, approximated radon projections of word image are considered and decomposed three times by repeating the same process. By doing this, we computed total sixteen matrices comprise directional multi-resolution information. We consider statistical measures as features. Precisely speaking, entropy (E) and standard deviation (S) of the *RWT* coefficients are computed and formed $16 * 2 = 32$ dimension feature vector. Entropy and standard deviation were selected, because it's successful application in classification of handwritten and printed text words [13].

Entropy (E) and standard deviation (S) are given by:

$$E = - \sum p(r_i) \log_2 p(r_i), S = \sqrt{\frac{1}{N-1} \sum (C_{mn} - \bar{C})^2}$$

where r_i is the discrete random variable which denotes the *RWT* coefficients and $p(r_i)$ is its probability of co-occurrence. C_{mn} and \bar{C} are the *RWT* coefficients and their mean, respectively.

We also investigated the performance of standalone radon transform and DWT. To do this, radon transform of input word image is computed at specific directions $\theta = (0, 30, 65, 85, 130, 155, 240, \text{ and } 250)$ and to form a feature vector radon projections are compressed to its standard deviation. Further we added local entropy, local range, and local standard deviation of word image. Now, it comprises the feature vector with 11 dimensions. As mentioned previously, word image is decomposed four times using (Daubechies-9) wavelets. It gives total 16 matrices of wavelet coefficients, by taking it's statistical measures entropy and standard deviation were computed and

32-dimensional feature vector is generated. Experiments with *RWT*, *RT*, and *DWT* are reported in experiment section separately.

2.3 Classification

LDA From many available classifiers, linear discriminant analysis (LDA) becomes more popular because of its simplicity, easy computation and considerable generalization ability. LDA achieves higher-level class discrimination by maximizing the ratio between-class and within-class variance. In this paper, LDA is used to classify the handwritten script words. The classification function for dataset X and classes C is given as

$$g(X) = W^T X \quad (4)$$

where W is the linear projection. The between-class scatter matrix S_b can be calculated as

$$S_b = \sum_{i=1}^C n_i (m_i - m)(m_i - m)^T \quad (5)$$

where m_i be the mean of i th class and m is mean of all data set. n_i presents the number of samples in i th class. The within-class scatter matrix is defined as

$$S_w = \sum_{i=1}^C \sum_{x \in X} (X - m_i)(X - m_i)^T \quad (6)$$

Now, given the quadratic distance d of $g(X)$ and centers $V_i = W^T m_i$ compared in LDA space and new sample classified to class label $\omega \in C$, accordingly:

$$\omega = \operatorname{argmin}_{1 \leq i \leq c} d(g(X), V_i) \quad (7)$$

SVM Support vector machine (SVM) classifier is introduced by Vapnik [18]. SVM is known as most sophisticated classifier, among the others. In SVM, m -dimensional input space X is mapped into l -dimensional feature space z . In z , quadratic programming problem is solved to separate two classes by the optimal separating hyperplane. The basic SVM can be extended using kernel tricks [16].

In our experiment, we use SVM with radial basis function, RBF kernel function, which gives decision function as follows:

$$D(X) = \sum_{i \in S} \alpha_i y_i \exp(-\gamma \|x_i - x\|^2) + b \quad (8)$$

In this case, support vectors are centers of RBF; more details are given in [16, 18].

KNN The basic and simple classifier K-nearest neighbor is also take into account. In this technique, data is classified based on majority voting among it's nearest neighbors. To find nearest neighbor, suitable distance measure can be used. In our case, we use value of $K = 1$ and Euclidean distance as distance measure to find nearest neighbor.

Let $P(p_1, p_2, \dots, p_n)$ be the training data and $Q(q_1, q_2, \dots, q_n)$ be the testing sample. Euclidean distance between P and Q is defined as follows:

$$D(P, Q) = \sqrt{\sum_{i=1}^n (p_i - q_i)^2} \quad (9)$$

3 Experiments

3.1 Data Set

In this work, we have used total 6000 handwritten words of two scripts, namely Kannada and Roman, with 3000 words of each script, respectively. To create a data set of handwritten words, eighty different native writers are selected belonging to different age-groups, profession, and gender. Each writer is provided A4 sheet with printed matter, which comprises 70–120 words and requested to write the same text. To get more unlike words, we have incorporated different text categories such as history, fiction, science, story. These handwritten sheets are scanned with HP with different resolutions ranging from 200 to 300 DPI with HP Laser Jet Pro MFP M128FN scanner and stored in tiff format for further use. A few samples of Kannada and Roman words are shown in Fig. 4

3.2 Evaluation Protocol

To evaluate the performance of our method, we have used N-fold cross validation (CV). Total data is divided into N approximately equal subparts. From N subparts, single subpart is used for validation, while remaining N-1 subparts serve as training.



Fig. 4 Sample words of Kannada and Roman scripts from our dataset

This process repeated for N subparts, and average of all results is calculated. In our tests, we use N=10. The accuracy is calculated as given below:

$$Accuracy = \frac{\# \text{Correctly Identified Words in the Class}}{\# \text{Total Words in the Class}} \times 100 \quad (10)$$

3.3 Results and Analysis

To observe the behavior of proposed directional multi-resolution features, thorough experimental tests are conducted on our Kannada and Roman handwritten word data set. Results of different features and classifiers combination are shown in Tables 1, 2 and 3.

Based on our reported results, we observe the following:

1. We note that the classification accuracy of proposed directional multi-resolution RWT features and SVM is highest. It shows promising performance with accuracy of 97.98%. In the same spirit, LDA continues with accuracy of 96.
2. In addition, we compared script classification performance of radon transform plus statistical textures and wavelets. Results are reported in Tables 1 and 2.
3. Sum to all, in Fig. 5 we shown comparison of all three feature extraction methods and different classifiers. Speaking with respect to classifiers SVM and LDA

Table 1 Scriptwise recognition accuracy with radon and textures combination

Script	LDA	SVM	KNN
Roman	89.50	97.56	80.16
Kannada	87.80	93.66	88.56
Average	88.65	94.12	84.36

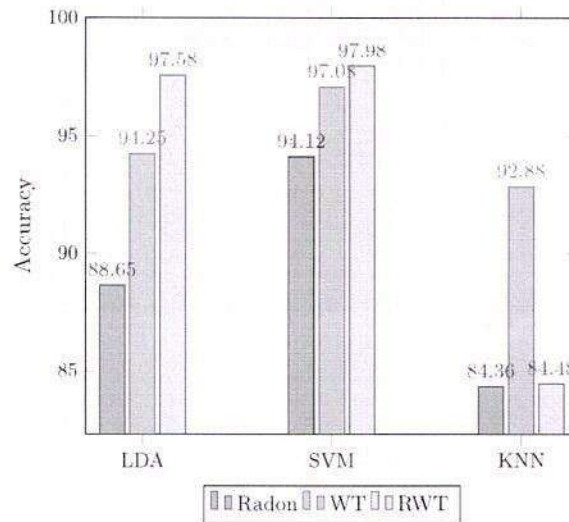
Table 2 Scriptwise recognition accuracy with wavelet features

Script	LDA	SVM	KNN
Roman	96.83	96.43	92.13
Kannada	91.66	97.13	93.63
Average	94.25	97.08	92.88

Table 3 Scriptwise recognition accuracy with radon wavelet multi-resolution features

Script	LDA	SVM	KNN
Roman	98.30	99.26	82.43
Kannada	96.86	96.70	86.53
Average	97.58	97.98	84.48

Fig. 5 Performance of LDA, SVM, and KNN classifiers with different features



shown consistent higher performance, at the opposite, KNN works poor. Proposed directional multi-resolution *RWT* features are outperformed at highest accuracy of 97.98%.

3.4 Comparison

In this section, we compared our work with some earlier published research works, those consider handwritten word-level script identification. In [11] used directional cosine transform (DCT), to capture directional energies of script. They reported classification accuracies of words at bi-scripts, tri-scripts, and multi-scripts scenarios, while dealing with Kannada and Roman bi-script combination they got accuracy of 96.23% and 92.80% with LDA and KNN, respectively. This method needs normalization of image size in squared form. Features based on DCT, Gabor filter, and wavelets with neural network are reported in [12] for word-level handwritten script identification at bi-script scenario. Accuracy of 96% is reported for Kannada and Roman script words but classification accuracy decreases when number of characters are less than two in the word. Our method exposes use of radon and wavelet transforms to extract directional multi-resolution features of words. We achieved accuracy of 97.58%, 97.98%, and 84.48% with LDA, SVM, and KNN, respectively. It can be noted that our method does not need any image size normalization and it also works well when number of characters present in word are less than or equal to two. Brief summarization of comparison is given in Table 4.

Table 4 Comparison with earlier published works

Method proposed by	Dataset size	Features	Classifier	Accuracy (%)
M. Hangarge et.al	3000 words	Directional discrete cosine transform	LDA and KNN	96.23 and 92.80
G. G. Rajput et. al	2000 words	DCT, Gabor filters and wavelets	Neural network	96
Proposed method	6000 words	Radon and wavelet transforms	LDA, SVM, and KNN	97.58, 97.98 and 84.48

4 Conclusion

In this paper, we have presented method to identify handwritten script at word level, while using Kannada and Roman scripts. This method is based on radon and wavelet transforms and provides directional multi-resolution information about script. Statistical measures of directional multi-resolution information with SVM outperformed in the task of word-level script identification. We also analyzed the performance of stand-alone radon and wavelet transforms in combination with LDA, SVM, and KNN.

Promising results achieved on our small data set encourage us to extend our method to other scripts. Thus, we planned to develop generalized framework for script identification at word level.

5 Ethics Approval

This study is approved by KASCC Ethics Approval Committee (Institutional Ethics Committee of Karnatak Arts, Science, and Commerce College, Bidar, Karnataka, India (KASCCEC/0117/Dated: 25/01/2017)). Informed consent from the participants is also taken before collecting the samples of handwriting.

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☰ Contents

I. Introduction

Automatic graphics recognition which includes, the interpretation of engineering drawings, maps, structural floor plans, electronic circuit diagrams, mathematical equations, LOGOS, trademarks, and music symbols. With the advancement of technology in the recent past, optical music recognition (OMR) got huge attention from document image analysis community. OMR is the process of identifying the music scores from document images and converting them into machine understandable form for further automatic processing. It has several applications such as automatic understanding and processing of music in written form, digital heritage preservation, entertainment, music production etc.

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Old Handwritten Music Symbol Recognition Using Directional Multi-Resolution Spatial Features

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Abstract— Automatic recognition of musical symbols received huge attention in the last two decades. Most of the work is carried out for the recognition of printed symbols whereas little attention is given to handwritten symbols. In handwritten musical symbols, when we deal with historical and old handwritten musical symbols, the problem becomes more challenging. In this paper, we have dealt with recognition of old handwritten musical symbols. In our method, we have used directional multi-resolution statistical descriptors by combining Radon Transform, Discrete Wavelet Transform, and Statistical Filters. Simple k-NN classifier is used with five-fold cross validation. We have achieved encouraging results on our dataset.

Keywords— *Optical Music Symbol Recognition; Discrete Wavelet Transform; k-NN Classifier; Statistical Filters; Radon Transform*

I. INTRODUCTION

Automatic graphics recognition which includes, the interpretation of engineering drawings, maps, structural floor plans, electronic circuit diagrams, mathematical equations, LOGOS, trademarks, and music symbols. With the advancement of technology in the recent past, optical music recognition (OMR) got huge attention from document image analysis community. OMR is the process of identifying the music scores from document images and converting them into machine understandable form for further automatic processing. It has several applications such as automatic understanding and processing of music in written form, digital heritage preservation, entertainment, music production etc.

Traditionally, music is written on paper with pen before it is played. Though advanced technology brought the MIDI interfaces for recordings the music with the help of computer, it requires processing knowledge and skills of technology, and hence it becomes a tedious process. Therefore, optical music recognition is always very simple and effective solution for automatic music processing. Our aim in this paper is to focus on optical recognition of music symbols. The problem of music symbol recognition involves the problem of research and, hence received considerable attention in the past two decades. Most of the work is focused on printed music score recognition but very few studies on handwritten music symbol recognition have been undertaken. Further very few works have been undertaken to

address the problem of optical recognition of old music symbols, because it has some key issues such as deformations, writing style variability, size, shape and ink intensity variations. To deal with these issues, in this paper, we have presented hybrid features which analyze the old handwritten music symbols from coarse to fine level, with discrete wavelet transform based multi resolution analysis, directional energy measurement with radon projection, and spatial arrangement with statistical filters. Hence, we have called these features 'directional multi resolution spatial features'.

Optical music recognition is carried out for three different types of music symbols input i) Printed ii) Offline Handwritten iii) online Handwritten.

Cuihong Wen Anu et al. [1] proposed a system for music symbol classification by using Directed Acyclic Graph Large Margin Distribution Model (DAG-LDM). They conducted test on 10,000 music symbols which consist of both handwritten and printed music symbols and achieved higher accuracy. Christopher Raphael et al. [2] proposed new approach to recognize optical music symbols. They used top down model based method and template matching particularly for isolated symbols. Florence Rossant et al. [3] developed a method to recognize the printed music scores by using fuzzy modeling method and achieved an accuracy of 98.55%, they conducted test on 100 music sheets. Gabriel Viglinsoni et al. [4] proposed a system to recognize printed music scores. They worked on CWMN database by applying graphical method and achieved an f score of 91%. Sukalpa Chanda et al. [5] compared feature extraction methods for offline isolated musical symbol recognition. Texture-analysis and shape-descriptors were compared in their study. Jiyong Oh et al. [6] proposed a system for online recognition of handwritten music scores. They worked on HOMUS dataset. H. Miyao and M. Maruyama [7] proposed an online handwritten music score recognition approach. They classified the symbols by using SVM classifier first; DP matching was used as series data and the directional strokes of the image as features. They achieved an accuracy of 97.60% for recognition rate and 98.80% for recognition of music symbols. Sangkuk Lee et al. [8] presented handwritten music symbol classification by using deep convolutional neural networks, HOMUS dataset was used to carry out the experiments. Muhammed Sharif et al. [9] proposed a

COMSCAN system to recognize printed music scores. Eleven music sheets were considered for experimental tests and achieved an accuracy of 99.5%. Tatiana et al. [10] proposed a system to recognize the printed music scores by applying horizontal and vertical projection bitmap using Probabilistic Neural Network Classifier. Cuihong Wen et al. [11] worked on music sheet recognition without segmenting the symbols to recognize the printed music scores; they tested 15 music sheets and used CNN as a classifier and achieved an accuracy of 98.71%. Yuan Hsiang Chang et al. [12] proposed a system to recognize the music scores by using digital image processing techniques such as vertical and horizontal projections, morphological processing and template matching, and achieved an accuracy of 91.7%. Alicia Fornes et al. [13] presented a method to recognize 17-19 century handwritten music symbols. Dynamic Time Warping (DTW) and Zernike moments were used to extract the features. They compared Zernike moments with DTW, and achieved higher accuracy for DTW and confirmed that Zernike moments are not suitable for handwritten music symbols. George Calvo-Zaragoza et al. [14] worked on recognition of online as well as offline handwritten music symbols. According to them an effective way of digitizing music composition is by using an e-pen and tablet application for online method, whereas for offline they created a dataset of 3800 samples of 32 different music symbols and achieved higher accuracy for offline method.

From our quick review of related work, we realized that, old handwritten musical symbol recognition still has huge scope as this problem has received very little attention. In this paper, we have proposed a method for the recognition of old handwritten musical symbols.

II. PROPOSED METHOD

In this paper, we have attempted recognition of isolated old handwritten musical symbols; our method involves three steps namely preprocessing, feature extraction and classification. In preprocessing we have simply resized our image, Discrete Wavelet Transform, Radon Transform and Statistical Filters based features and simple k-NN classifier is employed for classification. Work flow of our method is presented in Fig.1.

A. Preprocessing

Preprocessing is significant step for any computer vision applications and it varies from application to application. In our experiment, we have simply binarized the input symbols and normalized to size of 64×64 . We have shown preprocessing of handwritten music symbol in Fig 2.

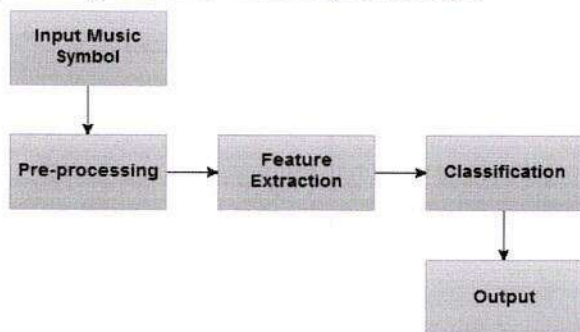


Fig. 1. Work flow of proposed method

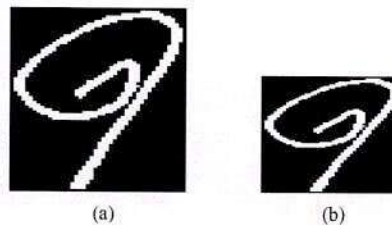


Fig. 2. (a) Input Music Symbol (b) Resized to 64x64

B. Feature Extraction

Discrete Wavelet Transform: Discrete Wavelet Transform is one of the most popular techniques used in image analysis. In the process of two dimensional DWT two types of filters i.e low pass and high pass were used. First rows go through division operation and then columns follow the same. After the sampling, image is divided into mainly four blocks, one approximation and three detail blocks. Approximation represents high scale low frequency components of the signal and a detail block represents low scale high frequency components of the signal mainly horizontal, vertical and diagonal. More details on Wavelet analysis are given in [15].

Radon Transform: In image processing, Radon Transform is used to reconstruct the image by considering projections from the image. The projections are forward and backward projections. Backward projections are used to reconstruct the image. Mathematically a projection is represented as $y=ax+b$, here the image may be two dimensional or three dimensional. In two dimension an image is represented as a function $f(x,y)$ these image projections are considered along all the directions by taking different angles such as $\theta = 0, 45, 90, 180, 270$ mage. Than the sum of all lines from the image are integrated and radon transform of this image is represented as

$$R(\rho, \theta) = \iint_{-\infty}^{+\infty} f(x, y) \delta(x \cos \theta + y \sin \theta - \rho) dx dy \quad (1)$$

Statistical Filters: Spatial information provides variability in image regions. To capture the image variability in spatial regions, we have used statistical texture filters. In our case, we have applied 3×3 window calculating defined statics in defined neighborhood in image $I(M,N)$ and produced filtered image of the same size as input image $I(P,Q)$. We used local range, local standard deviation and local entropy to create statistical filters.

Directional Multiresolution Spatial Descriptors were computed by combining different statistical measures obtained from the above three methods. The process of feature extraction is summarized as below:

a) Radon transform at different angles (0, 30, 90, and 135) is computed to get directional energy of pixels spread in musical symbols, it gives four projections of radon transform at given angle theta.

b) Multiresolution analysis is performed by applying two dimensional discrete wavelet transform up to four levels, which yields 16 sub -bands.

c) Statistical filters were applied to measure the spatial variation among the different musical symbols. This

operation provides 3 filtered images from three statistical filters as mentioned in above section.

To get fixed size feature vector, we have considered two statistical measures namely Standard Deviation and Entropy from each Radon Projection ($4 \times 2 = 8$ Features), DWT sub-bands ($16 \times 2 = 32$ features) and Statistical filters ($3 \times 2 = 6$ Features) i.e. $8 + 32 + 6 = 46$ Features. More details are given in [14].

C. Classification

The k-Nearest Neighbor (k-NN): The k-Nearest Neighbor (k-NN) classifier is one of the simplest classifiers among all machine learning methods. This method belongs to supervised instance based learning method. In addition, it does not required any systematic training efforts, whereas its performance depends on the quality of distance measure. Based on the heuristics, k-NN tried to assign the class label to unclassified point which is near to labeled data point. In this way, a k-nearest neighbor classifier finds the k data points from the given training data closest to the point being considered, and classifies the given data point amongst its k-nearest neighbors based on majority rule. In our case, we have used $k=3$ and city block distance as distance measure to search nearest neighbors.

III. RESULTS AND DISCUSSION

To evaluate and exhibit the performance of proposed method, we have used the dataset of Isolated Old Handwritten Music Symbols from [13], it consists of total seven classes having four accidental and three clef symbol types, with the total of 2128 clefs and 1970 accidentals. During the experimentation, we used fivefold cross validation, in which the whole dataset is divided into five equal sub- parts. While any one part is used for testing, then other four parts served as training. In this manner, the same process is repeated five times in such a way that each part gets opportunity to serve in training and testing procedure. K-NN classifier with $K=3$ and city block distance measures is used for classification. We have defined the accuracy for each musical symbol as follows:

$$\text{Accuracy} = \frac{\# \text{ correctly classified symbols in class}}{\# \text{ total symbols in class}} \times 100 \quad (2)$$

TABLE I. CLASS WISE RECOGNITION ACCURACY OF MUSIC SYMBOLS

Sl	Music symbol Class	Accuracy in %
1	ACCIDENTAL Double Sharp	99.79
2	ACCIDENTAL Flat	96.13
3	ACCIDENTAL Natural	97.24
4	ACCIDENTAL Sharp	97.09
5	CLEF Alto	96.84
6	CLEF Bass	98.91
7	CLEF Treble	99.39

TABLE II. COMPARISON WITH SIMILAR WORK

Method	DTW [13]	Proposed method
Accuracy	89.55%	98.16%

Fig. 3 shows the music symbol classes. In Table I, we have shown class-wise recognition accuracy of old handwritten musical symbols. Highest Accuracy of 99.79%

is achieved for Accidental double sharp and lowest accuracy of 96.13% is achieved for accidental flat. Overall accuracy of 98.16% is achieved for all seven classes. We have shown the comparison of our work with previously reported work in Table II.

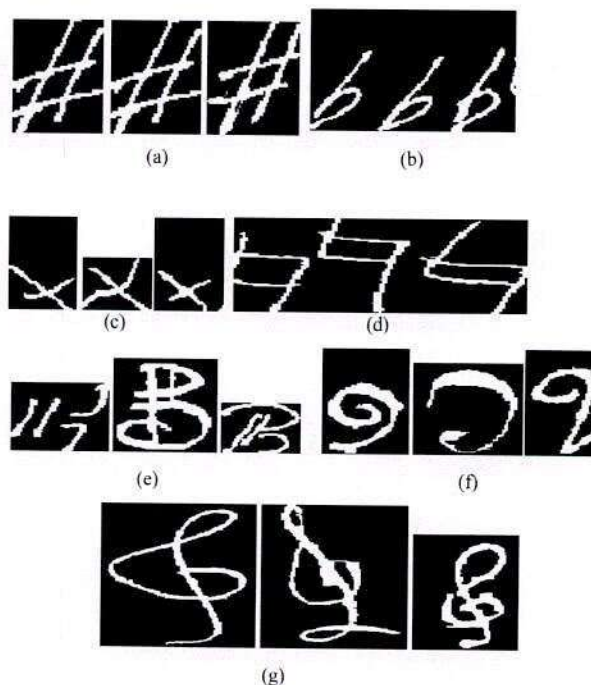


Fig. 3. (A) Accidental Sharp, (B) Accidental Flat, (C) Accidental Double Sharp, (D) Accidental Natural, (E) Clef Bass, (F) Clef Alto, (G) Clef Treble

IV. CONCLUSION

In this paper, we have presented directional multiresolution spatial descriptors based combination of Radon Transform, Discrete Wavelet Transform and Statistical Filters to recognize isolated old handwritten music symbols. We have used basic k-NN classifier with Five- fold cross validation to evaluate the performance of our method with publicly available dataset and got encouraging results with an accuracy of 98.16%. In future, we will extend our study with combination of classifiers and other texture-based methods.

ACKNOWLEDGMENT

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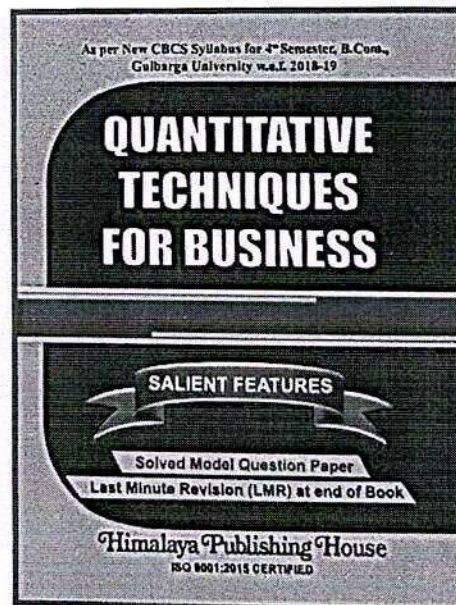
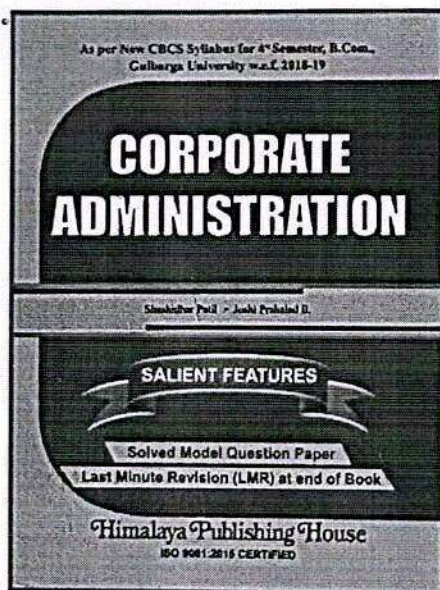
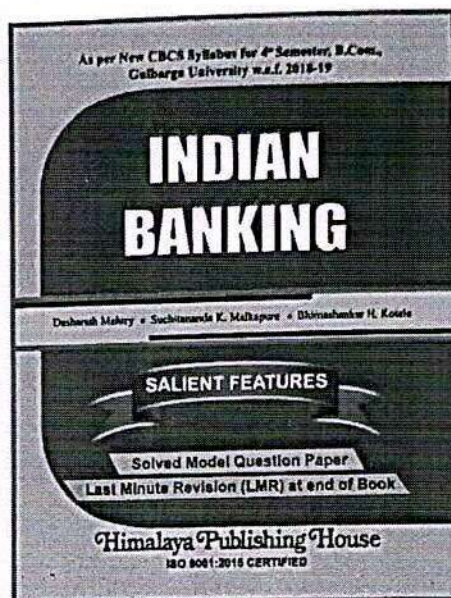
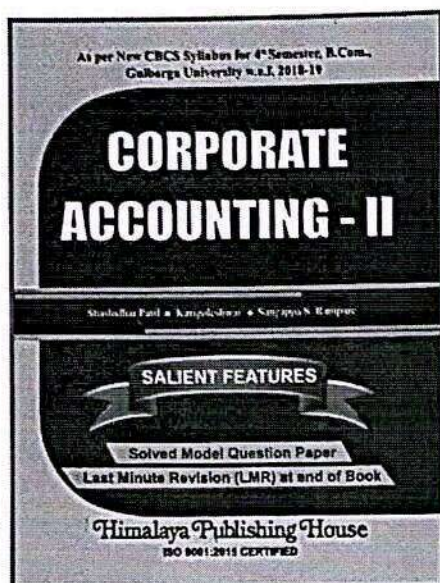
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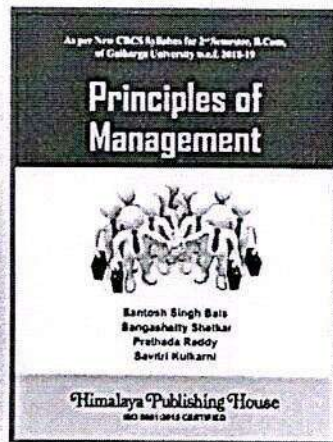
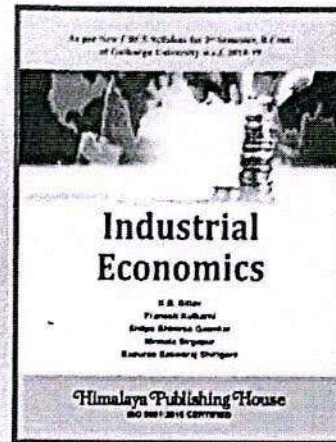
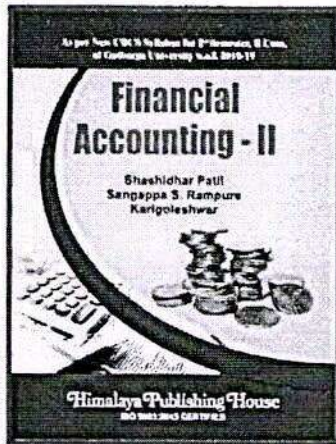
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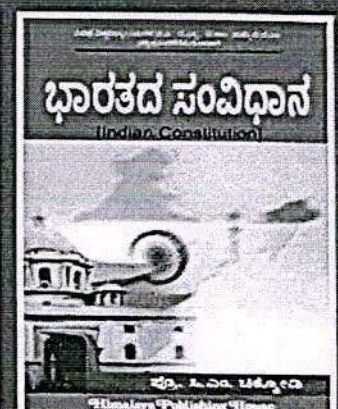
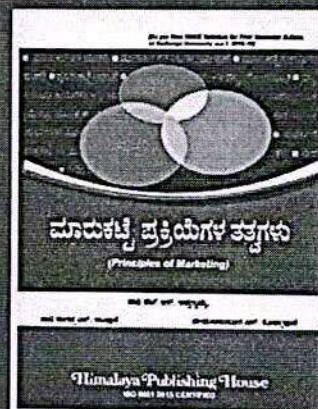
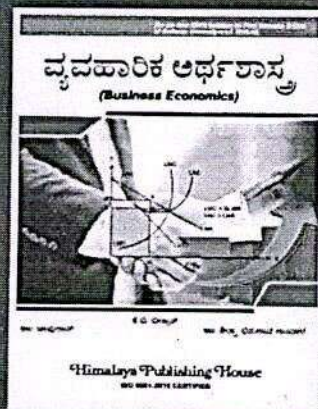
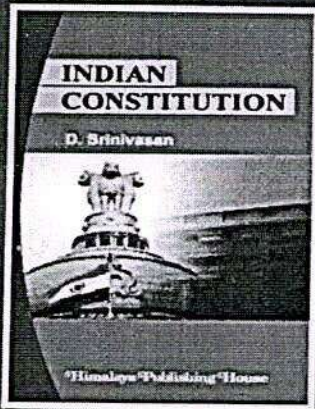
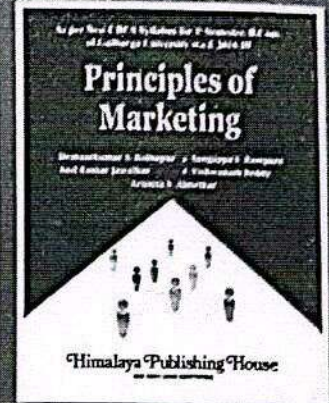
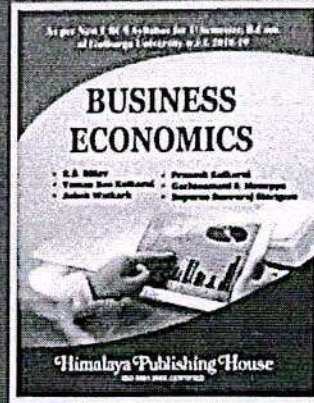
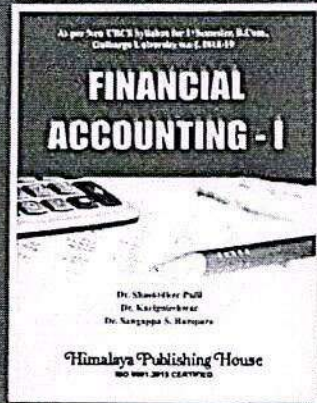
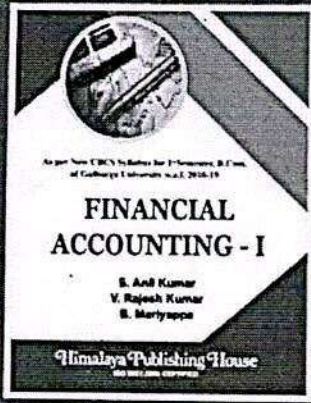
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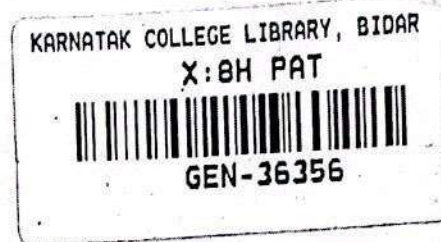
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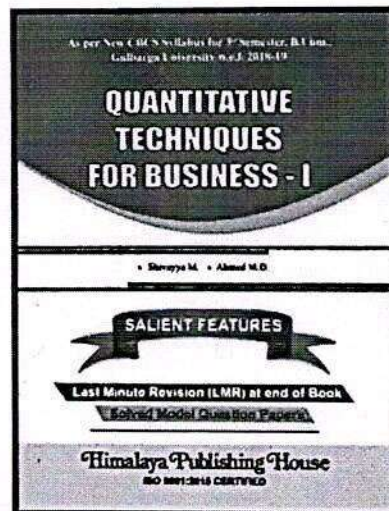
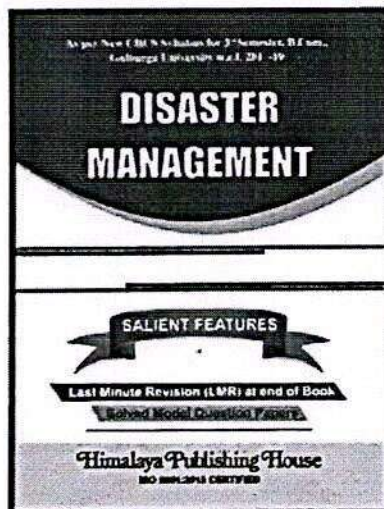
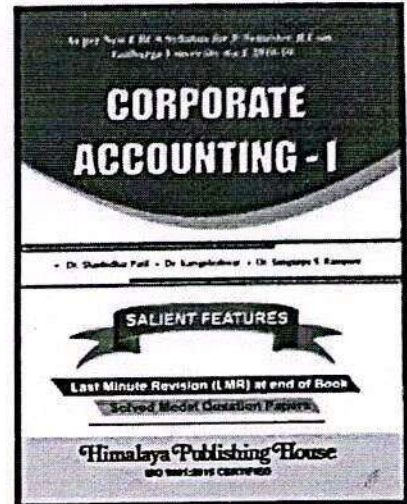
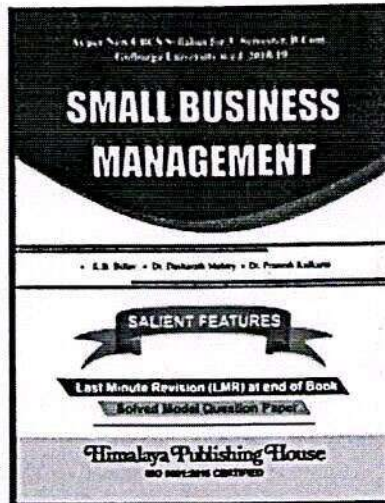
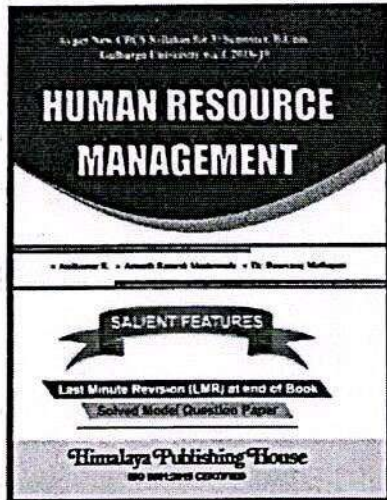
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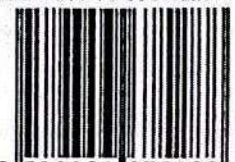
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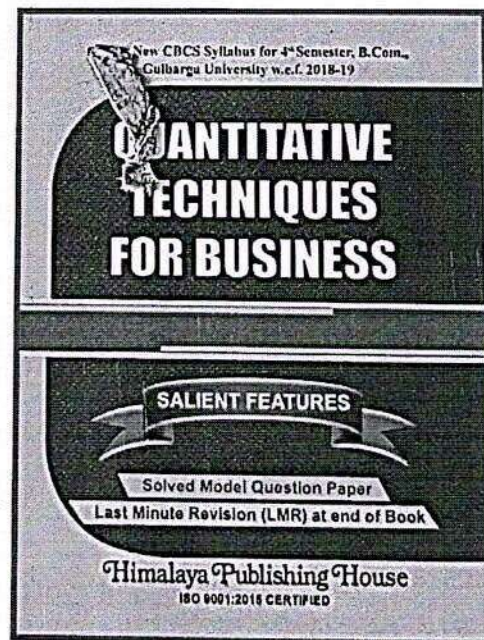
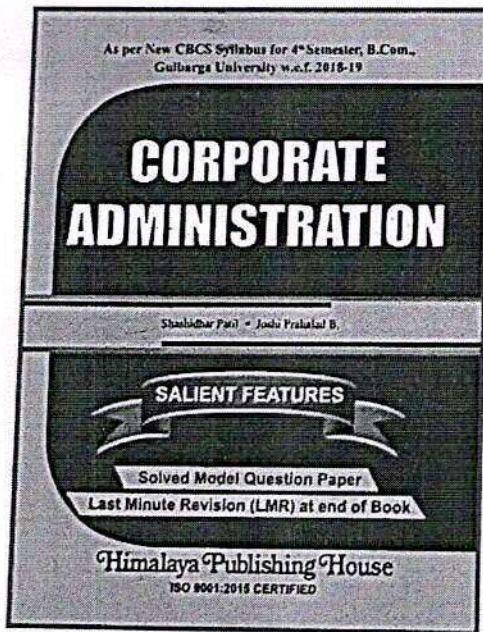
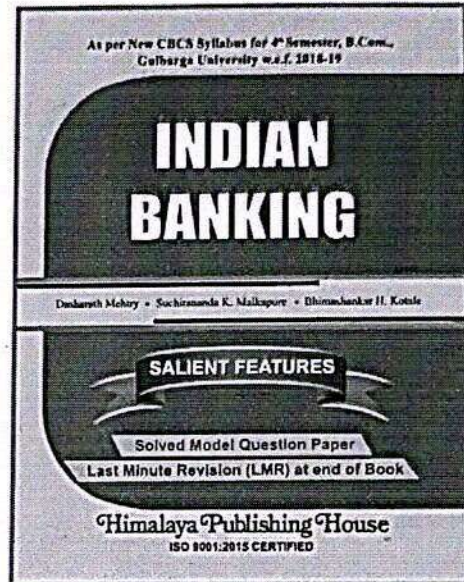
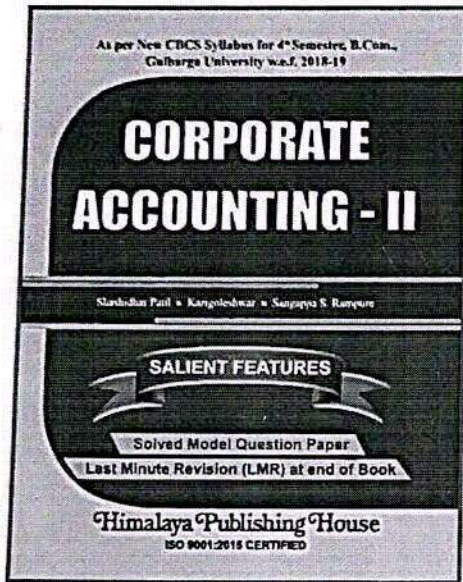
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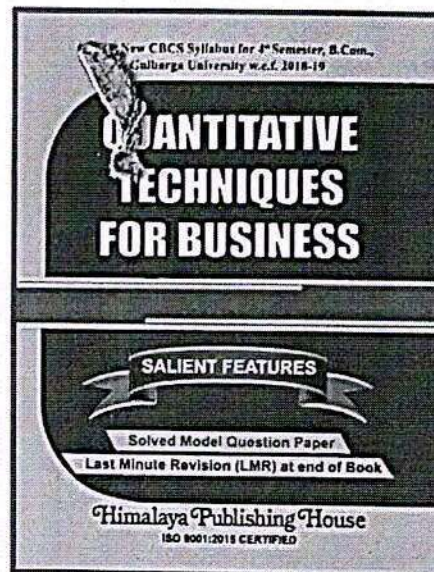
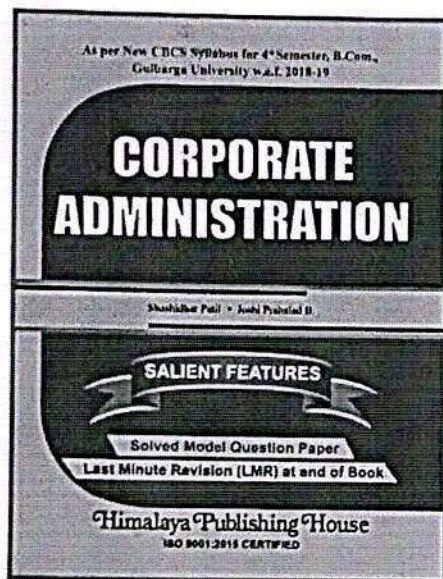
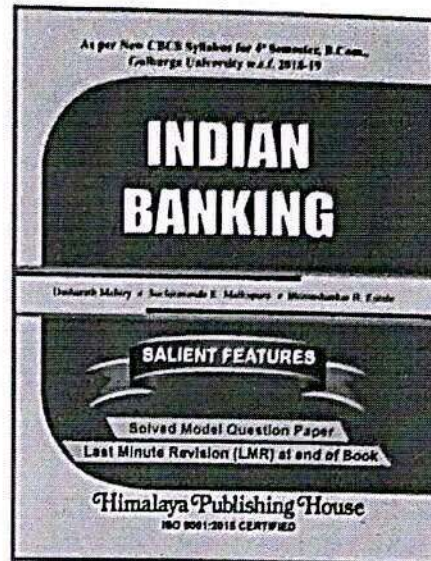
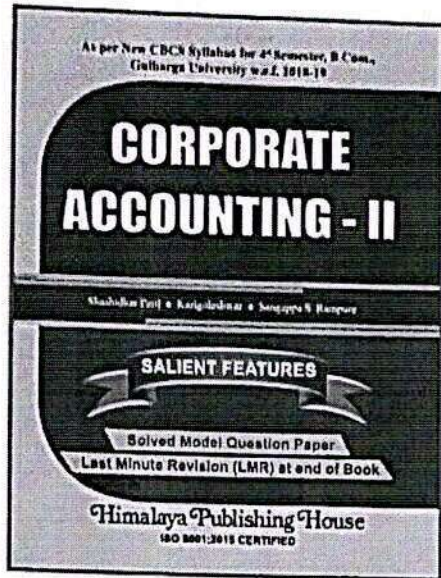


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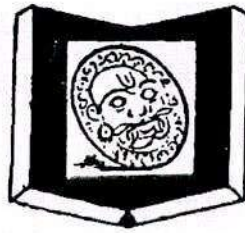
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Automatic recognition of musical symbols received huge attention in the last two decades. Most of the work is carried out for the recognition of printed symbols whereas little attention is given to handwritten symbols. In handwritten musical symbols, when we deal with historical and old handwritten musical symbols, the problem becomes more challenging. In this paper, we have dealt with recognition of old handwritten musical symbols. In our method, we have used directional multi-resolution statistical descriptors by combining Radon Transform, Discrete Wavelet Transform, and Statistical Filters. Simple k-NN classifier is used with fivefold cross validation. We have achieved encouraging results on our dataset.

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Automatic Human Gender Identification Using Palmprint



Shivanand S. Gornale, Abhijit Patil, Mallikarjun Hangarge
and Rajmohan Pardesi

Abstract Automatic human gender identification can help in a developing number of applications related to human–computer interaction (HCI), human–robot interaction and surveillances technologies. Besides, it can also assist in human face identification by reducing the issue of comparing to half of the database. Several biometrics have been used to identify the human gender, but no significant achievements have been reported in the literature. In this study, we have taken palmprint biometrics, because it contains sufficient significant discriminating information like ridges, wrinkles, and principal lines. Based on it, we are going to propose an algorithm for automatic human gender identification. It involves three steps: extraction of ROI, features computation, and classification. Gabor wavelets are employed to extract the palmprint features as they are potential in capturing discriminating textural properties of the underlying image. Its performance is evaluated with simple KNN classifier on publicly available CASIA palmprint Database. The results obtained are quite encouraging with average accuracy of 97.90% with 10 cross validation.

Keywords Biometrics · Gender identification · Gabor wavelets · Palmprints · KNN classifier

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1 Introduction

Gender identification was first perceived as an issue in psychophysical studies with insights on the efforts of understanding human visual processing and identifying key features employed to categorize the gender of an individual [1]. In earlier research, it has been seen that there exist greater differences between male and female characteristics which can be further used to improve the performances of recognition applications in surveillance and computer vision [2, 3]. Automatic human gender identification using palmprint will be among the next most popular biometric technology, especially in forensic applications, thanks to its uniqueness and strength. In fact, palmprint data can easily be collected with low-cost devices and minimal cooperation from subjects. Moreover, several palmprint properties can be used to identify person gender information. Palmprints are collections of two distinguishable properties, in medical terminology that are known as palmar friction ridges and palmar flexion creases. These structures are permanent, unique, and immutable too for an individual [4]. In this study, we propose a system for automatic gender identification using palmprint. This system would be useful to enhance the accuracy of other biometric identification systems [5]. The related work is reviewed and reported in Sect. 2. The proposed methodology is discussed in Sect. 3. In Sect. 4, experimental results are described and concluding remarks are reported in Sect. 5.

2 Related Work

Identification of gender using palmprint does not have much literature. However, a few studies are reported on gender identification using hand geometry, hand shape with face was used in [6] for the biometric verification system. Geometric properties like boundary and Fourier descriptors on Zernike moments are reported in [7]. This work takes advantages of fingers and palm region separately by dividing them into six different parts (five fingers + palm) Eigenspace distance with score-level fusion with LDA has been used to identify human gender.

In [8] the authors have designed a methodology which uses geometric properties of palm such as length, aspect ratio, and width with polynomial smooth SVM (PSSVM) classifier.

The topic of Gender identification is of considerable interest in Dermatoglyphic's for medico-legal investigation. The authors in [9] found variations in different designated areas from palmprint among men and women. They showed that palm ridge density is higher in women than men. Additional to these claims are that the right and left palmprints of men does not have noteworthy distinction, but they exist in those of women. Another interesting study was reported in [10] based on the North Indian community. They have studied

palmprints ridge density to infer gender in forensic investigation. These researchers have reported their claim with ROC analysis.

From the quick review made in the aforementioned paragraph, we can notice that feature extraction techniques used are of two types local and global [11]. Palm acquisition is an issue that is considered, as a few researchers suggest, contact-free [4, 12–16] and a few suggest peg aimed palm print acquisition [4]. Contact-free palm acquisition causes some disfigurements like translation, rotation, scale variation, and light variations.

In this work, we took the advantages of global features based on Gabor Wavelets as we deal with contact-free palm in our study. Our goal is to develop a generic system that can differentiate between male and female efficiently based on palmprint. From the literature, we noted that previous studies were accomplished on limited datasets with conventional tools and techniques.

3 Proposed Methodology

In this paper, we have proposed three steps namely preprocessing which involves extraction of ROI from the palmprint images. Feature computation deals with textural analysis using Gabor Wavelets and *KNN* algorithm for classification (Fig. 1).

3.1 Preprocessing

Our aim in preprocessing is to extract the ROI; to do this; First, the input image convolves with Gaussian low-pass filter; and then binarized using Otsu method [17]. Then image centroid is detected to search for two keypoints, first key point is the gap between forefinger and middle finger, and the second keypoint is the gap between the ring finger and the little finger, to set up coordinates. To determine the palmprint coordinate system, the tangent of previously located two keypoints is

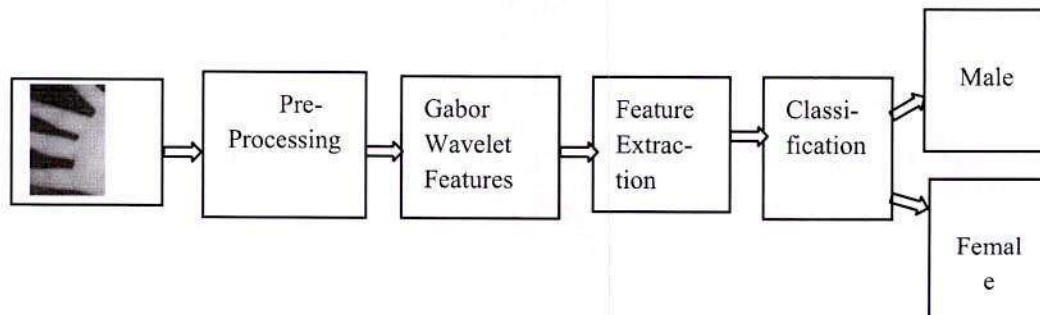


Fig. 1 Diagrammatic representation of proposed method

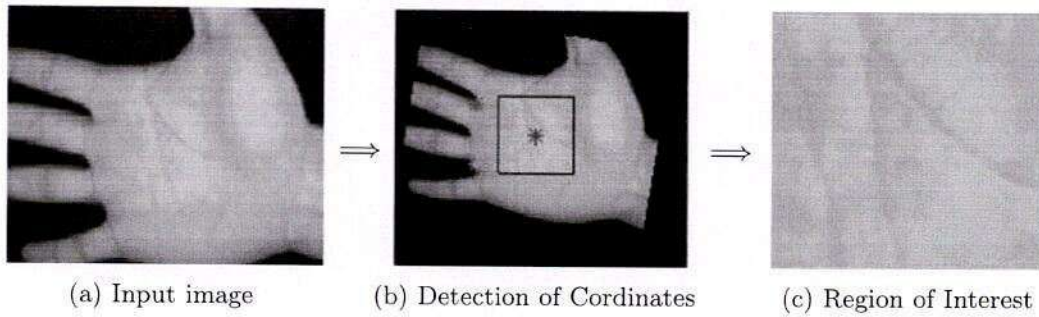


Fig. 2 An example showing ROI extraction

computed. The line joining these two keypoints is considered as y -axis, to locate the origin of coordinate system, based on the middle of those keypoints through which line passes and should be perpendicular to y -axis. After getting the coordinate system, the sub-image from coordinates is considered as ROI and these ROIs are considered for further experiments. More details on ROI extraction are given in [8]. The process of ROI extraction can be understood from Fig. 2.

3.2 Feature Extraction

In practice, it has been observed that principal lines do not contribute enough to high precision by likeness among various palms. Although ridges play a vital role in palmprint-based gender identifications it is as yet a troublesome task to extract them precisely. Being motivated from this phenomenon, we took advantage of global texture information of palmprint ROIs. We considered Gabor wavelets due to their biologically inspired nature in information representation, as they mimic human visual system [4, 9, 16, 18]. Gabor wavelets are a popular tool in computer vision and image processing in many applications [19], such as in content-based image retrieval, texture analysis, character recognition, biometrics, etc.

$$G(x, y; f, \theta) = \left\{ \exp \left[\frac{1}{2} \left(\frac{m}{\sigma_x} \right)^2 + \frac{(n)^2}{\sigma_y} \right] \cos 2\pi f(m) \right\} \quad (1)$$

$$m = x \sin \theta + y \cos \theta \quad (2)$$

$$n = x \cos \theta - y \sin \theta, \quad (3)$$

where σ_x^2 and σ_y^2 control the spatial extent, θ is the orientation of the filter and F is frequency of the filter. Two-dimensional Gabor wavelet filter bank extracts the features from input palm image. Let $F(x, y)$ be the intensity of (x, y) points of an image and its convolution with Gabor filter, the reaction to every Gabor part representation is the complex function of real part ($G(x, y; f, \theta)$) and an imaginary

part. In our work, feature computation is accomplished using Gabor Wavelets on ROI extracted images, feature vector is created by calculating mean squared energy and mean amplitude from each filtered ROI image. The ROI image is convoluted with Gabor wavelets considering six different orientations from (0° , 30° , 60° ... 150°) and five different frequencies $f = \pi/2i$, ($i = 1, 2, \dots, 5$). The ROI extracted images is convoluted via the FFT (Fast Fourier Transformation) with the Gabor Wavelets filter bank to grab a significant amount of deviation from palmprint images. Gabor filter bank computes 30 Gabor square energy and 30 Gabor mean amplitude energy from ROI images. The obtained feature vector is of 60 features obtained each from male and female palmprint images. Further, these features are used to train and test with the classifier. Sample palmprint ROIs convoluted with Gabor filters are shown in Fig. 3.

3.3 KNN Classifier

As per the literature, it is perceived that no other authors have tried working along with ROI and Principal Lines, generally [1, 4, 6–10, 12–20] for palmprint-based gender identification. In this paper we have employed traditional ridge-related analysis in our work: we have utilized basic classifier technique, i.e., *KNN*

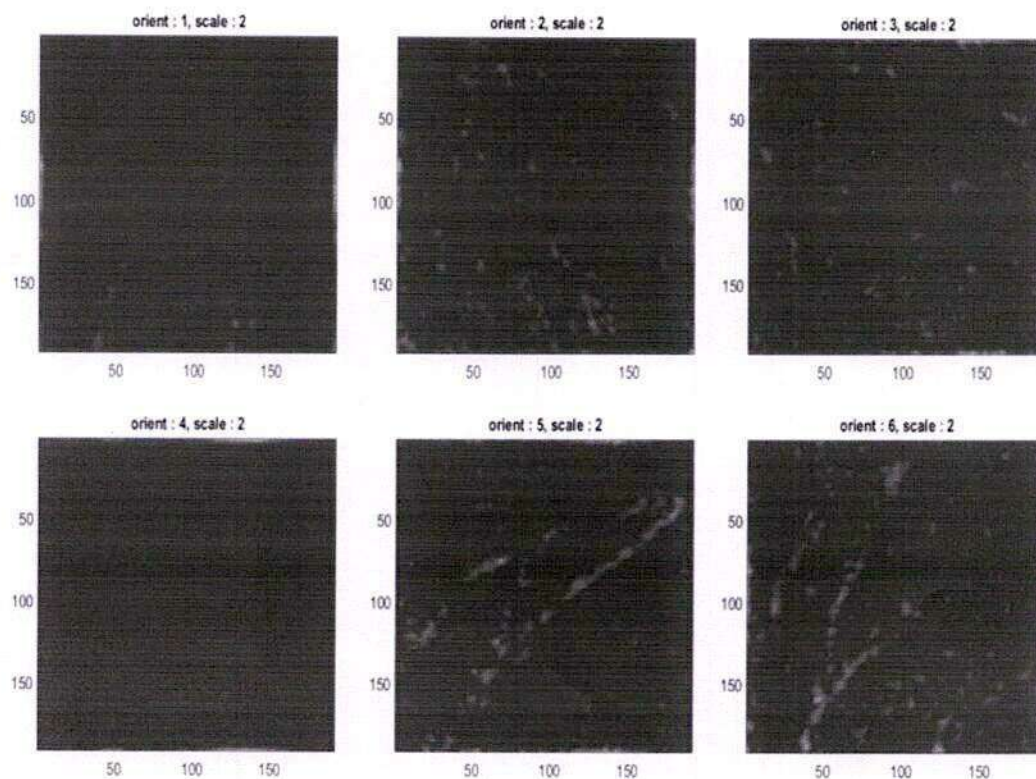


Fig. 3 Gabor filters applied on palmprint ROIs with fixed scale and different orientations

classifiers for Gender Identification. Basically, *KNN* shows the training data M , then finds the minimum distance d between training sample X and testing pattern N using

$$d_{\text{euli}}(M, N) = \sqrt{(M - N_i)^T (M - N_j)} \quad (4)$$

$$d_{\text{city}}(M, N) = \sum_{j=1}^n (|M_j - N_j|) \quad (5)$$

$$d_{\text{cos}}(M, N)_{st} = 1 - \frac{M_s N_t'}{\left(\sqrt{(M_s N_t')} \sqrt{(M_s N_t')} \right)} \quad (6)$$

$$d_{\text{corr}}(M, N)_{st} = \left(1 - \frac{(M_s N_t) (M_s N_t)'}{\sqrt{(M_s N_t') (M_s N_t'')} \sqrt{(M_s N_t') (M_s N_t)'}} \right) \quad (7)$$

4 Experimental Analysis

4.1 Dataset and Evaluation Protocol

We have used publicly available CASIA Palmprint Database collected by the Chinese Academy of Science Institute of Automation (CASIA) [20, 21]. The database consists of palmprints captured from 312 subjects out of which 274 were male volunteers and 76 were female volunteers. From each subject, palmprint images from both left and right palms were collected by giving them prior directions. To evaluate our method, we have considered a subset of 4207 palmprints, from which 1129 are female palmprints and 3078 are male ones (Fig. 4).

In our experimental tests, we use 10-fold cross validation [22] to evaluate the performance of our proposed method. Experimentations are carried out with *KNN* classifier by altering the number of neighbors ($K = 1, 3, 5, 7, 9, 11$), and the performance of the algorithm is found optimal $K = 3$ respectively. Precision (P) and Recall (R) are computed and are represented as below

$$\text{Precision } (P) = \frac{T_p}{T_p + F_p} * 100 \quad (8)$$

$$\text{Recall } (R) = \frac{T_p}{T_p + F_n} * 100 \quad (9)$$

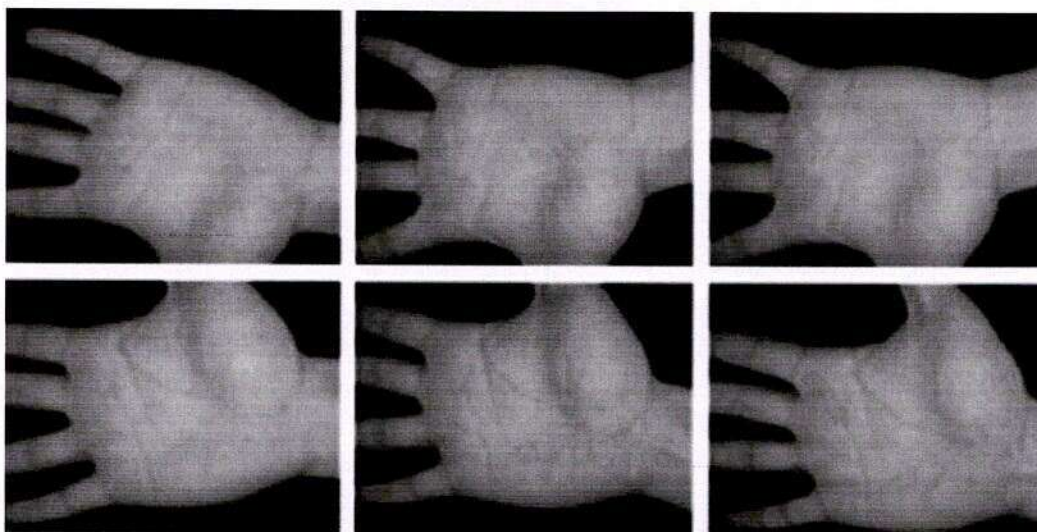


Fig. 4 Sample of CASIA database

$$\text{Accuracy } (A) = \frac{T_p + T_n}{T_p + T_n + F_p + F_n} * 100, \quad (10)$$

where T_p is True Positive, T_n is True Negative; F_p is False Positive and F_n False Negative.

4.2 Result Analysis

To realize the effectiveness of our proposed approach, we have worked out extensive experiments with K -nearest neighbor classifier. We also considered the different distance measures with varying k -values.

We observed that KNN outperformed when the value of $K = 1$. Highest accuracy of 97.9% is obtained with Correlation distance and lowest accuracy of 97.4% is obtained by cosine distance. City-block distance and Euclidean Distance have performed less than the Correlation distance and have yielded accurate result of 97.5 and 97.6%, respectively. Detailed results of exhaustive experiments are demonstrated in Table 1.

Table 1 Detail result analysis

KValue	City blocks			Cosine			Euclidean			Correlation		
	P	R	A	P	R	A	P	R	A	P	R	A
1	98.05	98.56	97.5	97.0	98.68	97.4	98.11	98.53	97.6	98.18	98.88	97.9
3	96.97	96.91	95.5	96.5	97.40	95.6	97.01	96.97	95.6	97.10	97.67	96.2
5	96.26	95.08	93.6	95.3	95.91	93.6	96.16	95.17	93.6	95.77	96.15	94.1
7	95.32	93.76	91.9	94.41	94.50	91.9	95.80	93.94	92.4	95.19	95.00	92.8
9	95.19	91.47	90	93.95	92.014	89.6	95.19	91.84	90.3	94.47	92.84	90.6
11	95.09	88.91	87.7	93.50	89.90	87.6	95.15	89.59	88.4	93.63	90.71	88.3

Table 2 Comapritive analysis

S. No.	Author	Features	Database	Classification method	Accuracy
1	Amayeh et al. [10]	Geometric features, boundary descriptors, Zernike moments and Fourier descriptor	20 males and 20 females palm prints	Score level fusion and LDA	98%
2	Ming et al. [6]	Geometric features like length, width and aspect ratio	180 palm print images of 30 voluntaries	PSSVM	85%
3	Present methodology	Gabor wavelets	CASIA database	<i>KNN</i>	97.90%

4.3 Comparative Analysis

In this section, we have compared our work with similar works found in the literature. In [7] the authors used Geometric features, boundary and Fourier descriptors on Zernike moments of hand geometry and achieved 98% result on dataset of 40 palmprints. Whereas in [8] the authors used very basic geometric properties such as length, aspect ratio, and width with polynomial smooth—SVM and got 85% accuracy in gender prediction. The drawback of the reported method in [7] is that it is not suitable for low resolution and far distance images captured using touch-free method, as they need touch-based palm acquisition. On the contrary, our proposed method is suitable for both the approaches: touch-based and touch-free. Our method outperformed with Gabor wavelets filter bank based texture features and very basic *KNN* classifier on large dataset consisting of 4207 ROIs of palmprints, which yielded the accuracy of 97.90%. In addition to this, our method is also immune to noise and low-resolution effects (Table 2).

5 Conclusion

In this paper, we have attempted a human gender identification problem using palmprints. Gabor Wavelets are used to extract discriminating texture features from palmprints. These features have exhibited significant performance that too with a simple *KNN* classifier. Exhaustive experimentations have been done on a relatively larger dataset of 4207 palmprint images with different distance measures and *K*-values to validate the performance of the algorithm. This analysis reveals that the proposed method has a remarkable performance with a simple classifier compared with the other methods. In future, we concentrate on the evaluation of (1) Different

texture descriptors (2) sophisticated ROI extraction techniques and feature selection techniques (3) Supervised and Unsupervised classifiers to devise a best generic algorithm.

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Automatic Gender Identification from Children Facial Images Using Texture Descriptors



Ayesha Iftikhar, Rehan Ashraf, Asim Saeed, Srinivas Alva and Rajmohan Pardeshi

Abstract Soft biometric such as gender significantly works to enhance the performance of biometric systems and also having applications in human–computer interaction, content-based indexing and retrieval, demographic studies, security, and surveillance. Gender identification among adults is easy as compared to in children, due to similarity of facial skin texture and appearance of faces. In this paper, we have introduced a technique to identify/classify the gender from facial images of children. In our method, we have applied three basic steps namely preprocessing, feature extraction, and classification. In preprocessing stage, face detection and normalization are performed. To extract the powerful features, we have computed different texture descriptors and after feature extraction process and SVM is applied for classification purpose. We have achieved the encouraging results in our experiments.

Keywords Gender identification in children · Facial images · Texture descriptors · Support vector machines · Soft biometric

1 Introduction

Biometric technology facilitates unique identification and verification based on physiological and behavioral attributes of a person. Physiological attributes include fingerprint, retina, palm, and face. Body movement, voice, handwriting, gait, etc., are considered as behavioral biometrics. Whereas in large biometric systems, soft bio-

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metrics such as age, gender, eye color, hair color, gives additional information about the person and helps to enhance the performance. With rapid development in technology, biometric became popular in different applications such as national citizen identification framework, access control, law enforcement, security and surveillance [1], and automatic monitoring. But success of these applications is restricted only up to adult population and not scaled for children.

As per the report of The National Database and Registration Authority (NADRA) of Pakistan [2], being one the largest citizens biometric data agency, it is lagging for the children biometric services. In the future, major required applications of biometric technology for children are vaccination monitoring, flood relief, offering of financial benefits, reunification during disaster management, etc. In [3, 4], authors studied and they explained the issues faced by children such as child sexual abuse, exploitation, child pornography, and prostitution. To overcome these kinds of problems, biometric will play a vital role. Now, while developing such large biometric system for children of any country, soft biometric such as gender will play a major role in enhancement of accuracy.

Biometric data acquisition from children is a major challenge, in such case, the current study is focused on facial information due to its easy way of recording and it also does not need any special technical requirements. The remainder of the paper is structured as follows: In Sect. 2, we have presented related work. In Sect. 3, we have briefed our method and Sect. 4 dedicated for experiments and discussion. We concluded in Sect. 5.

2 Related Work

Gender classification (GC) from face image is getting attention of researcher from past few years. In comparison with humans, machines find difficult to classify the gender automatically. GC from face is very useful research because face has many discriminant features which can be used to identify human gender. Many methods have been proposed for GC from face images. In [5], author proposed novel approach from face images for GC by using local texture pattern as feature descriptor. Support vector machine (SVM) is used for classification purpose. FERET database is used and compared with other comparable works. Author uses LZP (local zigzag pattern) as a feature descriptor. Gender classification from face is becoming very popular. In [6], author uses hybrid approach by fusion of face appearance features and geometry feature. Researcher picks Haar wavelet for representation of appearance features and Adaboost algorithm for the selection of strong features. In [7], complex value neural network serves as a classifier and LBP with PCA feature extraction techniques for gender categorization by face. This paper also compares the complex value with real value neural network. Author in [8], proposed gender recognition by top half face based on local appearance feature. This research is suitable in that condition where the lower part of face is hidden. In [9], author classifies gender by face from appearance base method. Compare the nonlinear SVM classifier performance with

traditional classifier like linear, quadratic, nearest neighbor as well as with modern RBF (radial base function) classifier. Study focuses on low-resolution thumbnail (21×21) images of front face images. In [10], authors presented a novel approach for gender classification from frontal facial images with SVM classifier and ICA Features. In paper [11], author presented a scheme for identification of children based on multimodal biometric. In paper [12], authors presented algorithms for newborn face recognition using principal component analysis (PCA), linear discriminant analysis (LDA), integrated principal analysis (IPA), speeded up robust features (SURF), local binary pattern (LBP), integrated component analysis (ICA). In [13], author proposes a novel approach by integrating face and soft biometric trait to improve the result about 5.6% on face biometric by use of 210 newborn data.

In [14], researcher investing the GC by using face image of per person. For this purpose, two types of features have been used. First appearance base and other is geometric base for appearance base (LBP and DCT) used and for geometry base (GDF) is used. GDF is based on the physical changes in male and female faces. In [15], author said that gender classification is challenging task on real-world face images due to nonsupport environment. Authors used (LFW) database. LBP with Adaboost is employed for the selection of discriminant features and obtained 94.81% result. Viola–Jones algorithm is used for face detection and image dimension is 250×250 . In [16], author claims that LBP histogram is good and different feature for the gender classification task from face images. Author compares his technique with more sophisticated Gabor filter technique and result was outperformed with raw pixel values as a feature are computationally less expensive. GC used in many other problems like it can reduce the search space for face recognition software. In [17], author projected 2DPCA (2D principal component analysis) for face recognition and test on ORL, AR, and Yale well-known databases. The ORL database assesses the performance under varied limitations of light and movement. The AR database computes the system working under the limitation of change of time in face expressions in light variation. When light and face expressions both vary, then Yale database is used to evaluate the system performance. 2DPCA is more simple than PCA. In accuracy term, it is most suitable than PCA. In [18] paper, author proposed a novel technique for GC by designing multi-resolution feature extraction method on the idea of local phase quantization (LPQ) by monogenic and intensity image. Features with LPQ are obtained from input image. SVM is used for classification. Author compares experiment result with two unconstrained LWF and groups public database. When the proposed result compares with other state-of-the-art approaches, the competed accuracy rate was 97.0% with LWF and 91.58% on group dataset. In [19], authors shown that, gender identification accuracy greatly affects with different age groups. Author claims that by using state-of-the-art method experimental study on big dataset of 8000 images from 0 to 93 age range display accuracy of GC on adult faces is 10% higher than the young and senior faces. Author studies that aging effect on human motivates to find which features on shape and texture differences on face can combine to tell about gender of human. LBP and HOG used to estimate the gender characterization difference with age. In [20] paper author introduce child robotic method for

interaction to estimate age and gender by 3D body matrix in real-world multi-party circumstances.

From our quick review presented in above paragraphs, it is clear that soft biometric plays a major role in human–computer interaction and enhancement of accuracy of biometric-based personal identification. Most of the work is dedicated toward adult biometric, whereas very limited focus is given toward children. In this paper, we have presented a method for gender identification from facial images of children.

3 Proposed Method

Our aim is to identify the gender from facial images of the children. To achieve this, we employed the three steps, preprocessing, feature extraction, and classification. In preprocessing, we have detected the face and normalized to a standard size. Histogram of oriented gradients (HOG) [21], uniform local binary patterns (ULBP), and Gabor wavelet transform (GWT) [22] based texture descriptors are used for feature extraction. These global approaches are found suitable for facial feature representation. SVM is considered for the classification. Block diagram of the proposed method is shown in Fig. 1.

3.1 Preprocessing

Images in our dataset are unconstrained in nature and having huge variation in illumination, background, size, pose and expressions; therefore, FEI tool [23, 24] is used to detect and normalize the face region. In preprocessing, we first detected the face region. Input image of size 240×260 is provided as input and FEI tool returns cropped normalized facial region. Output of face detection is shown in Fig. 2.

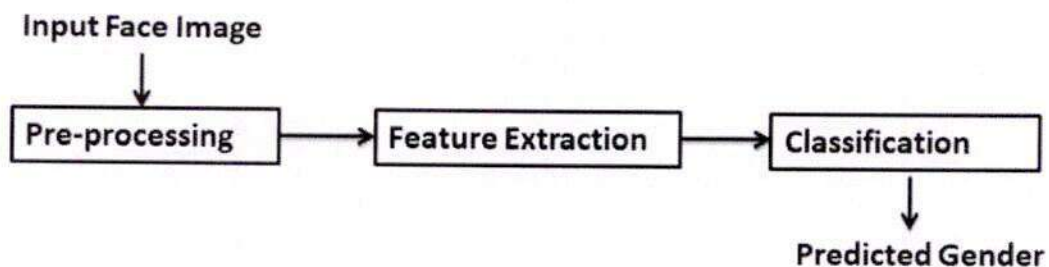


Fig. 1 Flow diagram of proposed method

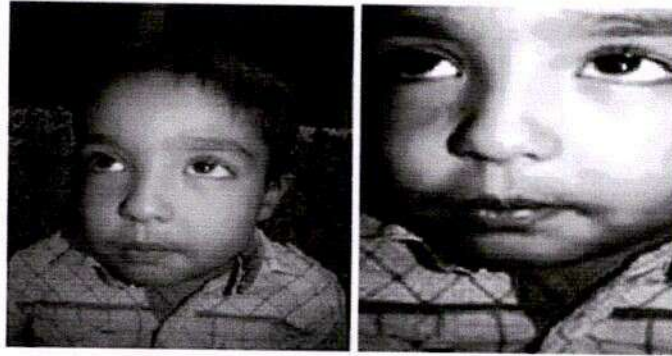


Fig. 2 Face detection and normalization using FEI tool

3.2 Feature Extraction

Selection of suitable features extraction technique is the significant step in designing of any image classification or retrieval system. Our main focus is on efficient feature extraction from face images to obtain discriminating features for gender classification. In this regard, we used uniform local binary patterns (ULBP) variant of LBP [22, 25], histogram of oriented gradients (HOG) [23], Gabor wavelet transforms (GWT).

Uniform Local Binary Pattern (ULBP): Local binary pattern (LBP) is one of the very efficient texture descriptors, and it labels the pixel of an image based on thresholding operation, later post-thresholding sequence of 0 and 1 considered as binary number further which is represented by its equivalent decimal. The same process is repeated for whole image. The histogram of these labels $2^8 = 256$ is used as texture descriptor. Further, it can be optimized by considering only limited intervals as given in (Ojala et al.), which gives only 59 descriptors. Once the labeled image $IL(x, y)$ is obtained, we can define the histogram of LBP as:

$$H_i \sum_{xy} IL \{ (x, y) = i \}, i = 0, 1, 2, \dots, n - 1 \quad (1)$$

where n is number of labels and $IL \{A\}$ is 1 if true or 0 if false. In Fig. 3, we have shown working of local binary patterns.

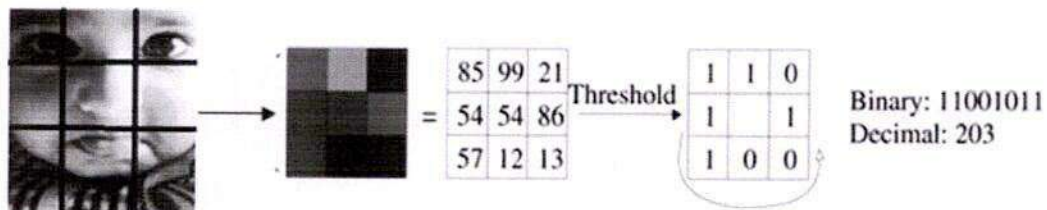
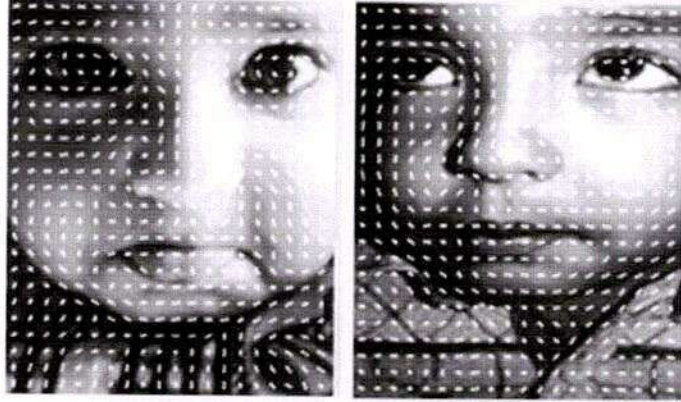


Fig. 3 Computation of local binary pattern

Fig. 4 Visualization of HOG descriptors applied to facial image of children



Histogram of Oriented Gradients (HOG): In image processing, HOG [20, 24, 26, 27] is very popular descriptor used for object detection. In local image portion, it counts the occurrence of gradient. The basic idea behind the HOG descriptor is: (1) It divides the image into small linked section and each section is called cell, and for each cell, it calculates the HOG magnitude and direction for each pixel within the cell and then, (2) According to the gradient, orientation discretizes each cell into angular bins. (3) Each cell pixel has gradient weight according to angular bin. (4) Groups of connected cell are called blocks and grouping of cells into block is base for grouping and normalization of histogram. Following Fig. 4 shows the HOG visualization on our dataset. We use different HOG cell size in our work like 16×16 , 32×32 and 64×64 .

Gabor Wavelet Transform (GWT): Gabor wavelets [28, 29] are powerful tool to highlight the texture regions in image. In the literature, Gabor wavelets are widely used to extract the texture information for various image processing and computer vision applications. Gabor wavelet is the group of Wavelets; [30] mathematically represented as:

$$\phi(x, y, w_0, \Theta) = \frac{1}{2\pi\sigma^2} e^{-(x_0^2+y_0^2)/2\sigma^2} [e^{jw_0x_0} - e^{-w_0\sigma^2/2}] \quad (2)$$

To compute the texture descriptors based on Gabor wavelets, we have applied GWT at six different orientations and five scales which gives us total 30 transformed images. Then, from each transformed image, we have computed mean and standard deviation to form fixed size compact feature vector of size 60.

3.3 Classification

Support Vector Machine: SVM is supervised classifier based on statistical learning theory [31], introduced by Vapnik. Due to its strong learning ability and discriminating power, we have chosen SVM for difficult task of gender classification in

childrens' facial images. The basic principle of SVM is that it tries to construct hyperplane separating the two linearly separable classes. Suppose we have n data vectors X_i . Separation of each data item in two classes is carried out by a discriminant function $g(X) = W^T .X - b$.

$$g(X) = W^T .X_i - b \geq 1 \quad (3)$$

where y_i is the class either +1 (boy) or -1 (girl). In case on nonlinearly separable data, then the SVM can be extended with kernel function, for instance some of them are Cubic, Gaussian, and Polynomial.

4 Experiments

4.1 Dataset and Evaluation Protocol

Dataset: Due to the unavailability of the standard dataset for gender classification for child, we created our own dataset. To introduce more complexities, we have captured the face images with different smartphones having different configuration to get more variation in images. Facial images in our dataset having different poses, expressions, background, and resolutions. The informed consent is recorded from parents of volunteers during the process of data collection. We have considered total 752 images for our experiment purpose out of which 441 are boys and are 311 are girls. Samples from our dataset are shown in Fig. 5.

We have used tenfold cross-validation technique instead of traditional classification, to evaluate the performance of our method. The whole dataset is divided into 10 sub-parts. When any of one sub-part is used for testing, the other nine sub-parts used for training. This method is repeated 10 times, in such way that each sub-part will serve for both training and for testing.

4.2 Results and Discussion

The exhaustive experimental tests are carried out on our dataset to measure the performance of the proposed method. We have tested the performance of ULBP, HOG, and GWT with SVM Classifier. Linear SVM further extended with kernel trick to enhance the classifier performance. Detailed results of our experimental tests are given in Table 1. We have observed that quadratic SVM with histogram of oriented gradients of cell size 16×16 given high accuracy in gender identification in child with an average accuracy of 89%, for boy 92% and 86% for girl. ULPB and GWT

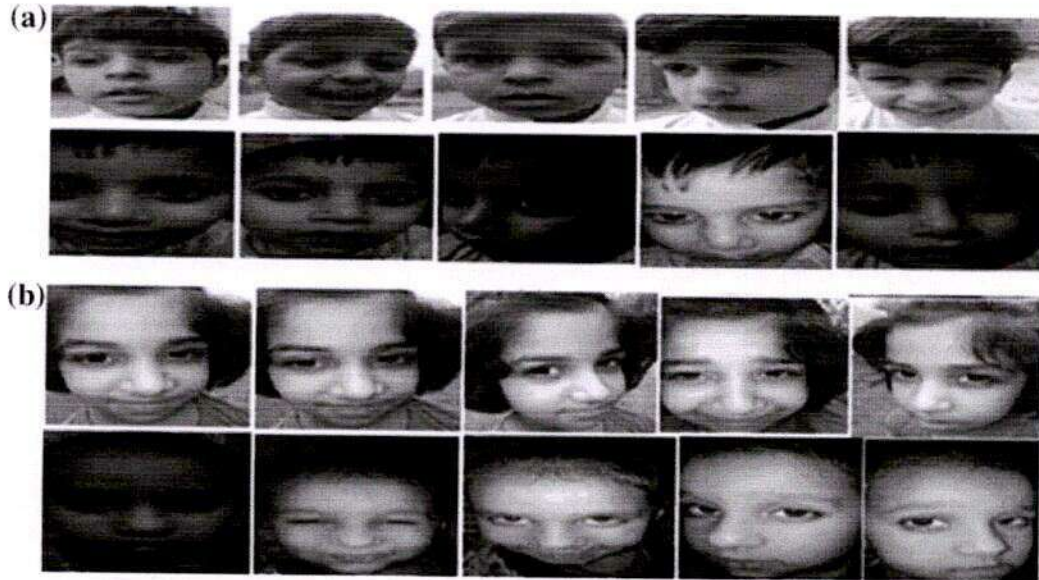


Fig. 5 Samples from our dataset **a** boys, **b** girls

Table 1 Gender identification accuracy using SVM with ULBP, GWT and HOG

Descriptors	Linear SVM		Avg. (%)	Quadratic SVM		Avg. (%)	Cubic SVM		Avg. (%)
	Boy (%)	Girl (%)		Boy (%)	Girl (%)		Boy (%)	Girl (%)	
ULBP	85	53	69	87	82	85	84	78	82
GWT	83	34	58	84	67	75	85	80	82
HOG (16 × 16)	88	74	81	91	86	88	92	86	89
HOG (32 × 32)	89	72	81	91	84	87	90	87	88
HOG (64 × 64)	78	62	70	85	77	81	86	84	85

with Cubic SVM given weak performance with the classification accuracy of 82 and 82%, respectively. Further we have also witnessed that, the Cubic SVM performed better as compared to Linear SVM and Quadratic SVM.

5 Conclusion

In this paper, we have presented a method for gender identification among children. This is the first approach when children gender identification considered for smartphone captured complex dataset having huge variations in pose, lighting, and expressions of children. We have evaluated the performance of different texture descriptors such as ULBP, HOG and GWT; it is observed that HOG with cell size 16×16 has good discriminating capacity as compared to ULBP and GWT. Support vector machine has performed better when extended with Cubic Kernel and given average accuracy of 89% for gender identification in child.

In the future, we will consider the combination of classifiers approach to enhance the performance of our system.

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Gender Identification from Frontal Facial Images Using Multiresolution Statistical Descriptors



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Abstract Gender identification is a significant task which is very useful in many computer applications like human–computer interaction, surveillance, demographic studies, and forensic studies. Being one of the most popular soft biometrics, gender information plays a vital role in improvement of the accuracy of biometric systems. In this paper, we have presented an approach based on multiresolution statistical descriptors derived from histogram of Discrete Wavelet Transform. First, the input facial image was enhanced by applying contrast limited adaptive histogram equalization. During feature extraction, multiresolution statistical descriptors were computed and fed into the Nearest Neighbor, Support Vector Machine, and Linear Discriminant Analysis classifiers respectively. We have achieved encouraging accuracy for gender identification on complex dataset of frontal facial images.

Keywords Discrete wavelet transform · Statistical features · Gender identification · Face image · Support vector machine

1 Introduction

The biometrics and multimodal biometrics plays a significant role in authenticating a person. The use of biometrics is unavoidable in present scenario, because, the use of technology has tremendously enhanced and reached almost all the corners of human life. The authenticity of a person/individual is the prime concern of many Governemnt/Private Institutions. Particularly, forensic department needs a robust tool to authenticate a person/individual. However, a common man yet to ensure

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that the use of latest technologies for his/her day-to-day transactions are secure. Most of the recent technologies are using biometrics for user authentication. In this context, to make the commercial applications more reliable and fast to work on large databases, which needs a robust database indexing technique. Gender is an important demographical attribute and plays a significant role for indexing biometric databases or to enhance the recognition accuracy of the various primary biometric traits.

In the recent past, there has been increased demand for personal identification and verification of authorized users of automated systems. Biometrics offers an effective approach to establish personal identity by using individual's unique, reliable and stable physical or behavioral characteristics. Biometrics is concerned with the unique, reliable and stable personal physiological characteristics such as fingerprints, palm-print, facial features, iris pattern, retina, and hand geometry. An efficient and effective automated biometric system is required for authentication and identification of an individual's gender. One of the oldest and most basic examples of the characteristics that are used for recognition by humans is the face. In this paper, we have presented a scheme based on multiresolution analysis which uses discrete wavelet transform for gender identification using frontal faces.

1.1 Related Work

Gender identification is a well-studied problem in the domain of biometric technologies; some of the earlier works related to gender identification are briefly presented in this paragraph. In [1], the authors studied gray level co-occurrence matrix and discrete wavelet transform-based method to extract features from frontal facial images. SVM classifier with tenfold cross validation is used for classification task and they achieved gender classification accuracy of 88%. A comparative study on large datasets of wild faces is carried out in [2], Histogram of oriented gradients and local binary patterns are compared with Convolution Neural Networks. In experimental analysis, the authors found that score level fusion would be a suitable solution for the problem of gender classification in wild and cross databases. Deep learning-based method is presented in [3] with built-in feature selection based on Linear Discriminant Analysis and an accuracy of 98% was achieved on LFW dataset. Gabor filters and Binary patterns based combined approach is presented in [4]. Using SOM Neural Networks, the authors achieved an accuracy of 90.33% in the task of gender identification. In [5], the authors presented comparative analysis of different machine learning algorithms for gender identification using frontal faces. Fuzzy inference-based technique is developed in [6] for gender identification in unconstrained cross database of facial image. Independent component analysis-based approach is presented in [7] to identify gender from frontal facial images from FERET dataset. Using SVM with ICA space, they achieved the accuracy of 96%. Discrete Wavelet transform-based features are used in [8] with the combination of SVM classifiers. In [9], hybrid features based

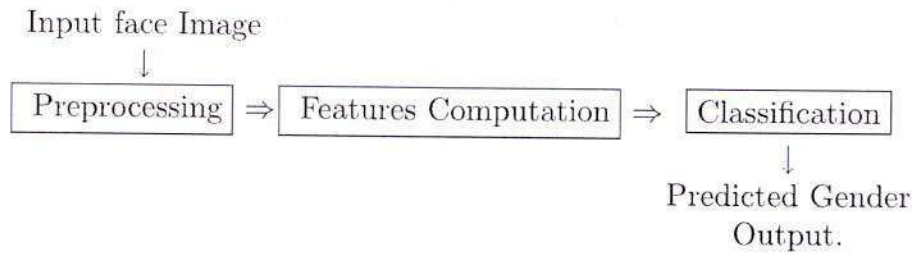


Fig. 1 Schematic diagram of our method

on Discrete Wavelet transform and LBP were presented for gender identification using facial images. From the above brief review, we observed that global features have shown promising results in gender identification from facial images. But huge dimensionality is one of the problems with global descriptors. In this paper, we have presented a global method based on histogram of Discrete Wavelet Transform-based coefficients and their statistical measures. This reduces high dimensional coefficients into fixed size features vector as compact representation of input facial image.

2 Proposed Method

Our method consists of three main steps preprocessing, feature extraction, and classification. In preprocessing step, we have performed image enhancement operation; to extract features Discrete Wavelet transform is employed and the task of classification is studied with three classifiers, namely Nearest Neighbor, Support Vector Machines, and Linear Discriminant Analysis. The block diagram of our proposed method is given in Fig. 1.

2.1 Preprocessing

Facial images in our dataset are well aligned and resized, and therefore in preprocessing, we have simply attempted image normalization operation, to balance the varying lighting conditions. First input image is converted from RGB to grayscale, where pixels are represented in two-dimensional space ranging from 0 to 255 gray levels. To normalize the grayscale, face image Contrast Limited Adaptive Histogram Equalization (CLAHE) was used. The advantage of this method over traditional histogram equalization is that it provides enhancement of contrast at the part of the image wherever necessary. More details on CLAHE are given [10]. For better understanding, we have shown preprocessing in Fig. 2.

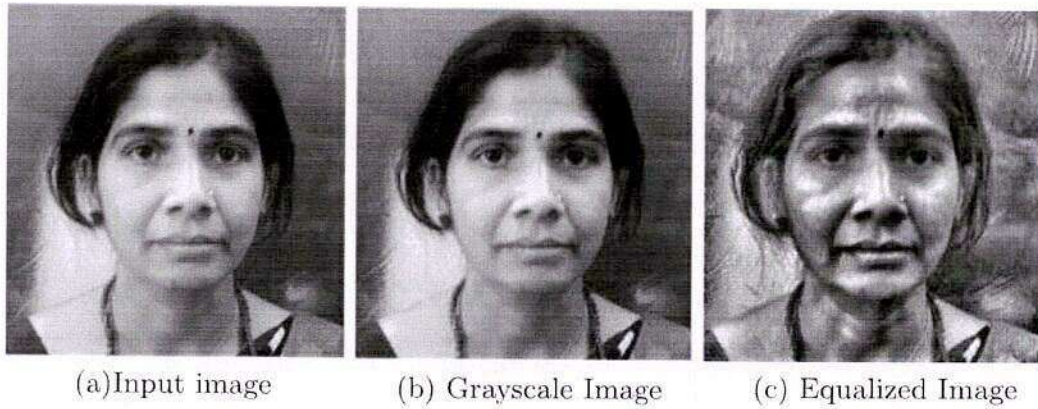


Fig. 2 An example showing preprocessing

2.2 Feature Extraction

Representing essential discriminative information is one of the goals of feature extraction techniques in digital image processing applications. In this paper, our main focus is on feature extraction from frontal facial images to obtain the gender information. To do this, we have used Discrete Wavelet Transform (DWT) [11], a well-known frequency domain method for Feature Extraction in this application. DWT is widely used in Image Compression [12] Filtering [13] and Feature Extraction [14]. It decomposes input image signal into different directions by analyzing at various scales and directions. Discrete Wavelet Transform in two dimensions decomposes signal into detail and approximation subbands. In approximation subband, the overall information of an input image is preserved and horizontal, vertical, diagonal details are presented in the detail subbands. To extract fixed size feature vector from facial images, first discrete wavelet Transform is applied up to four levels to decompose image into 16 DWT subbands and only 12 detail subbands are considered for feature computation, whereas 4 approximation subbands are excluded. For better visualization, only two-level decomposition of female face using DWT is shown in Fig. 3. The process of feature computation is explained briefly in the paragraph below.

Let C_i be the discrete random variable that denotes coefficients values in DWT subband and $h(C_i), i = [0, 1, 2, 3, \dots, k - 1]$ be the normalized histogram, where k is the possible DWT subband coefficient value. Shape analysis of computed histogram is performed via its central moment and the expression of the n th moment for mean can be expressed as follows:

$$\mu_i = \sum_{a=1}^k (C_i - m)^n \quad (1)$$

From the abovementioned central moment, statistical descriptors such as mean (F1), contrast (F2), relative smoothness (F3), skewness (F4), uniformity (F5), and entropy

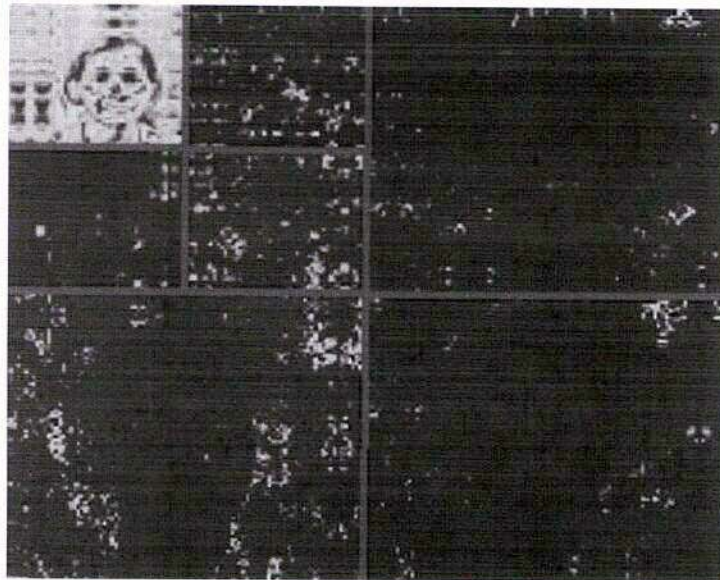


Fig. 3 Visualization of DWT decomposition of face image

(F6) are computed. In addition to this, each subband is further convolved with local standard deviation filter, local entropy filter and local range filter, and then from each filtered subband as single statistical value standard deviation is computed. From this procedure, we get three more features each from one filtered subband (F7, F8, and F9), more details on this are given in [15, 16]. In this way, fixed size feature vector of four levels \times 3 subbands \times 9 features = 108 features is computed from each input facial image.

Algorithm: Computation of Multiresolution Statistical Descriptors.

Input: Frontal Face Image F

Output: 108 dimension Features Vector

1. Compute DWT of (F)
2. Extract Vertical, Horizontal, and Diagonal DWT sub bands of input face image by performing four level decomposition.
3. At each level, for each subband Compute Histogram of DWT subband coefficients.
4. Compute mean (F1), contrast (F2), relative smoothness (F3), skewness (F4), uniformity (F5), and entropy (F6), these six statistical texture descriptors from each DWT subband histogram.

5. Apply local standard deviation filter, local range filter, and local entropy filter to each sub band separately.
 6. For each filtered subband, compute standard deviation (three features each from one filter).
 7. Concatenate features from step 4 and step 6 to form feature vector. We get three sub bands * 9 texture features * 4 level = 108 Features.
-

2.3 Classification

Nearest Neighbor Classifier: Nearest Neighbor, one of the most popular, basic, and simple classifier, is considered for the classification. One of the important things is that, it does not require actual training, whereas requirement of memory increases with training samples. Based on user-defined suitable distance measure it searches for nearest neighbor and gives label to unlabeled sample. To search nearest neighbor in this work, we have used Euclidean distance.

Let $A(a_1, a_2, a_3, \dots, a_n)$ be the training sample and $B(b_1, b_2, b_3, \dots, b_n)$ be the testing samples. Euclidean distance between A and B is defined as follows:

$$d(A, B) = \sqrt{(a_i - b_i)^2} \quad (2)$$

Support Vector Machine: Support Vector Machine (SVM) is statistical learning based classifier invented by Vapnick [17] SVM tries to find out an optimal hyperplane which separates the two classes for a set of n data vectors say X_i . A discriminant function $g(X) = W^T \cdot X - b$ separates each data item into two classes

$$g(X) = W^T \cdot X_i - b \geq 1 \quad (3)$$

where y_i is the class either +1 (male) or -1 (female) in our case.

Linear Discriminant Analysis: Linear Discriminant Analysis (LDA) is one of the most commonly used techniques, because of its simplicity, generalization capacity, and easy computation. The main idea behind the classification in LDA is to enhance the separation between classes by maximizing the ration of between classes to within-class variance. Here, LDA tries to identify male and female class of facial image based on between and within class variance, more details are give in [18].

3 Experiments

3.1 Dataset and Evaluation Protocol

Well-known publicly available dataset of frontal facial images available from [19] is considered for experiments. In the present study, a subset of 840 images (420 male and 420 female) is used for experiment purpose. These images were captured with varying pose, expressions, and lighting conditions. The images from dataset are not shown in the paper, due to privacy policy and instructions provided on dataset web page. For illustration purpose, we have used the face image of one of the volunteer from our Lab (Department of Computer Science, Karnatak Arts, Science and Commerce College, Bidar). Informed consent is also collected from the volunteer about the use of her photograph in research article.

To evaluate the performance of the method, we have used tenfold cross validation. First, the complete data is divided into ten subparts, when any one subpart serves as testing set, then other nine subparts are used as training set. This procedure is repeated ten times in such a way that each subpart gets an opportunity to serve in training and testing process. The average of these trials will be considered as final result. In this study, we have defined the accuracy as follows:

$$Accuracy = \frac{\text{\#No. of faces correctly classified in a class}}{\text{\#Total no. of faces in a class}} \times 100 \quad (4)$$

3.2 Results and Discussion

To investigate the gender discriminating ability of multiresolution features in frontal facial images, we employed three classifiers, namely Nearest Neighbor Classifier, Support Vector Machine, and Linear Discriminant Analysis. The results obtained during the experiments are shown in Table 1.

From Table 1, it can be observed that Nearest Neighbor Classifier outperformed in the task of gender identification using frontal faces with multiresolution statistical descriptors as compared with LDA and SVM and yields an accuracy of 96.42% for

Table 1 Gender identification accuracy in % using multiresolution statistical descriptors

Classifier	Male	Female	Overall accuracy
Nearest neighbor	96.42	97.85	97.14
Support vector machine	91.42	94.76	93.10
Linear discriminant analysis	88.80	96.90	92.85

Table 2 Confusion matrices for all three classifier

Nearest neighbor	
Male	Female
405	15
9	411
SVM	
Male	Female
384	22
36	398
LDA	
Male	Female
373	47
13	407

male, 97.85% for female and overall accuracy of 97.14%. LDA gave poor performance with the accuracy of 88.80% for male, 96.90% for female and overall accuracy of 92.85%. SVM served in between Nearest Neighbor and LDA with the accuracy of 91.42% for male, 94.76% for female and overall accuracy of 93.10%. For deeper understanding, we have given confusion matrices for all three classifiers in Table 2. From the experimental results, gender discriminating ability of the presented multiresolution statistical descriptors from frontal facial images is proved. The obtained accuracy of 97.14% is quite promising with complex dataset of frontal facial images. The main aim of the experiments presented in this paper is to prove the significance of compact statistical descriptors obtained using the histogram of DWT subbands in the task of gender identification based on frontal facial images. Comparison with state-of-the-art techniques is given in Table 3. From the facts and figures given in

Table 3 Comparison with existing approaches and proposed work

Methods	Dataset	Features	Accuracy (%)
Ergen et al. [1]	FEI	GLCM and DWT	87
JafariBarani et al. [4]	AR Face	Gabor and LBP	90
Lemley et al. [5]	FERET	CNN	96
TanerDanisman et al. [6]	FERET	ICA	95.67
Walczak et al. [8]	FERET	DWT	90
Proposed	Collection of facial images from university of essex	DWT based multiresolution statistical descriptors	97.14

Table 3. It can be noted that, our method outperformed in the task of gender identification as compared to existing one. In the future, we will explore the investigation of proposed features for gender identification using cross databases.

4 Conclusion

In this paper, we have presented multiresolution statistical descriptors for gender identification using frontal faces. Multiresolution statistical descriptors are computed by analyzing the shape of histogram obtained from DWT subbands. We achieved the promising accuracy of 97.14% with very basic and simple Nearest Neighbor classifier. We proved that the presented features have strong discriminating capacity and they can be applied effectively for the problem of gender determination using frontal facial images. In future, we will evaluate the proposed descriptors with publicly available large dataset of facial images.

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Logo Retrieval and Document Classification Based on LBP Features



C. Veershetty and Mallikarjun Hangarge

Abstract Logo is the strong entity for retrieval of Content-Based Information (CBI) from any complex document image. Logo is the primary and unique entity which is used to identify the ownership of the documents. Automatic logo detection and retrieval facilitates efficient identification of the source of the document and it is one of the interesting problems to the document retrieval community. We proposed a method based on Local Binary Pattern (LBP) for logo retrieval from document images. It is used to describe the logos both query and document logo. The candidate and query logos are matched based on the cosine distance. Based on it, distance ranks are generated to estimate the relevance of the logo. Later, matched logos are retrieved at a selected threshold of 98%. The performance of the algorithm is experimentally validated and its efficiency is measured in terms of the mean precision at the rate 87.80%, and mean recall rate 88.20% as well as average F-measure 88.00%.

Keywords Logo retrieval · Cosine distance · Digital image processing (DIP) Document image retrieval (DIR)

1 Introduction

Logo is one of the important objects of the document image, which play a vital role in document categorization. And, signature and seal are the other entities used for the classification of the documents. Basically, the logo detection aims at efficient localization and extraction of the logo. Figure 1 displays sample logos of different types [1]. Research algorithms reported in [2–5] are mainly focused on logo recognition. In [6], the authors discussed many schemes of segmentation such as X-Y tree,

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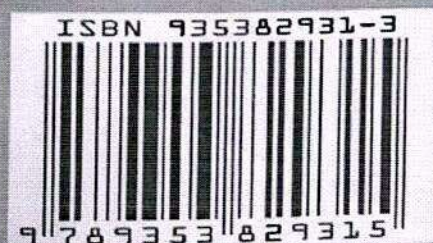
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भारत में उच्च शिक्षा : चुनौतियाँ और अवसर

श्रीमती गीता पोस्ते

सहायक प्राध्यापिका, हिन्दी विभाग

कर्नाटक कॉलेज, बीदर

सार :

दुनिया ने महसूस किया है कि राज्यों को आर्थिक सफलता सीधे उनकी शिक्षा प्रणालियों द्वारा निर्धारित की जाती है। शिक्षा एक राष्ट्र की ताकत है। एक विकसित राष्ट्र अनिवार्य रूप से एक शिक्षा शिक्षित राष्ट्र है। संयुक्त राज्य अमेरिका और चीन के बाद भारतीय उच्च शिक्षा प्रणाली दुनिया में तीसरी सबसे बड़ी है। आजादी के बाद से, एक विकासशील राष्ट्र के रूप में भारत शिक्षा के क्षेत्र में महत्वपूर्ण प्रगति कर रहा है। हालांकि भारत की उच्च शिक्षा प्रणाली के लिए बहुत सारी चुनौतियाँ हैं, लेकिन इन चुनौतियों को दूर करने और उच्च शिक्षा प्रणाली को बेहतर बनाने के लिए समान रूप से बहुत सारे अवसर हैं। इसके लिए अधिक पारदर्शिता और जवाबदेही की आवश्यकता है, नए सहस्राब्दी में कॉलेजों और विश्वविद्यालयों की भूमिका और लोगों को कैसे सीखना है, इस बारे में उभरते वैज्ञानिक शोध। भारत को कुशल और उच्च शिक्षित लोगों की जरूरत है जो हमारी अर्थव्यवस्था को आगे बढ़ा सकें। भारत अन्य देशों को अत्यधिक कुशल लोगों को प्रदान करता है; भारत के लिए हमारे देश को एक विकासशील राष्ट्र से एक विकसित राष्ट्र में स्थानांतरित करना बहुत आसान है। वर्तमान अध्ययन का उद्देश्य भारत में उच्च शिक्षा प्रणाली में चुनौतियों को उजागर करना और अवसरों को इंगित करना है।

कीअर्ड : शिक्षा, अवसर चुनौतियाँ, कॉलेज, विश्वविद्यालय

परिचय :

भारत की उच्च शिक्षा प्रणाली चीन और संयुक्त राज्य अमेरिका के बाद छात्रों के मामले में दुनिया की तीसरी सबसे बड़ी है। भविष्य में, भारत सबसे बड़े शिक्षा केंद्रों में से एक होगा। भारत के उच्च शिक्षा क्षेत्र ने आजादी के बाद से विश्वविद्यालयों स्तर के संस्थानों और कॉलेजों की संख्या में जबरदस्त वृद्धि देखी है। शिक्षा का अधिकार अधिनियम जो 6-14 वर्ष के आयु वर्ग के सभी बच्चों के लिए अनिवार्य और मुफ्त शिक्षा प्रदान करता है। वर्षों उच्च शिक्षा में निजी क्षेत्र की भागीदारी ने क्षेत्र में भारी बदलाव देखे हैं। आज भारत में ६०% से अधिक उच्च शिक्षा संस्थानों को निजी क्षेत्र द्वारा बढ़ावा दिया जाता है। इसने उन संस्थानों की स्थापना में तेजी ला दी है, जो पिछले एक दशक में भारत में दुनिया के सबसे बड़े उच्चतर शिक्षा संस्थानों में घर बना रहे हैं, जिनमें दूसरे स्थान पर छात्र नामांकन हैं (शगुरी, २०१३) विश्वविद्यालयों की संख्या ३४ गुना बढ़ाई गई है। १९५० में २०१४ में २० से ६७७। इन संख्याओं के बावजूद, अंतर्राष्ट्रीय शिक्षा रेटिंग अजेंसियों ने

इनमें से कई संस्थानों को विश्व रैंकिंग में सर्वश्रेष्ठ स्थान पर नहीं रखा है। इसके अलावा, भारत विश्व स्तर के विश्वविद्यालयों का निर्माण करने में विफल रहा है।

आज ज्ञान शक्ति है। जितना अधिक ज्ञान होता है, उतना ही अधिक सशक्त होता है। हालांकि, भारत को कड़ी चुनौतियों का सामना करना पड़ रहा है। शिक्षा में बढ़ते निवेश के बावजूद, इसकी २५ प्रतिशत आबादी अभी भी निरक्षर है; केवल १५ प्रतिशत भारतीय छात्र हाई स्कूल तक पहुँचते हैं, और सिर्फ ७ प्रतिशत स्नातक (मसानी २००८)। भारत में शिक्षा की गुणवत्ता चाहे दुनिया के प्रमुख विकासशील देशों की तुलना में प्राथमिक या उच्च शिक्षा में काफी खराब है। २००८ तक भारत के बाद के माध्यमिक संस्थानों में भारत की कॉलेज-आयु की आबादी के ७ प्रतिशत के लिए केवल पर्याप्त सीटें प्रदान की जाती हैं, देश भर में २५ प्रतिशत शिक्षण पद खाली हैं, और ५७ प्रतिशत कॉलेज प्रोफेसर्स के पास या तो मास्टर या पीएच.डी डिग्री की कमी है, २०११ तक भारत में ५,२२,००० (विज्ञान और प्रौद्योगिकी शिक्षा, २००९) के वार्षिक छात्र सेवन के साथ १५२२ डिग्री अनुदान प्राप्त इंजीनियरिंग कॉलेज हैं, साथ ही २,६५,००० के वार्षिक सेवन के साथ १२४४ पॉलिटेक्निक हैं। हालांकि इन संस्थानों को संकाय की कमी का सामना करना पड़ता है और शिक्षा की गुणवत्ता (मित्रा २००८) पर चिंता जताई गई है।

इन चुनौतियों के बावजूद भारत की उच्च शिक्षा प्रणाली के पास समान रूप से इन चुनौतियों को दूर करने के बहुत सारे अवसर हैं और अंतर्राष्ट्रीय स्तर पर अपनी पहचान बनाने की क्षमता है। हालांकि, इसे और अधिक पारदर्शिता और जवाबदेही की आवश्यकता है, नई सहस्राब्दी में विश्वविद्यालयों और कॉलेजों की भूमिका, और लोगों को कैसे सीखना है। भारत अन्य देशों को अत्यधिक कुशल लोगों को प्रदान करता है, हमारे देश को एक विकासशील राष्ट्र से एक विकसित राष्ट्र में स्थानांतरित करना बहुत आसान है।

भारत में उच्च शिक्षा क्षेत्र का विकास :

जैसे जैसे उच्च शिक्षा प्रणाली बढ़ती है और विविधता आती है, समाज तेजी से कार्यक्रमों की गुणवत्ता, सार्वजनिक मूल्यांकन और उच्च शिक्षा संस्थानों की अंतर्राष्ट्रीय रैंकिंग के बारे में चिंतित है। हालांकि ये तुलनाएँ शोध प्रदर्शन को अधिक करने के लिए होती हैं, अनुसंधान प्रदर्शन को संस्थागत मूल्य के एक यार्डस्टिक के रूप में उपयोग करते हैं। यदि ये प्रक्रियाएँ शिक्षण की गुणवत्ता को संबोधित करने में विफल रहती हैं, तो यह भाग में हैं क्योंकि शिक्षण गुणवत्ता को मापना चुनौतीपूर्ण है। (हर्नाई, २००८)

भारत हमेशा से विद्वानों और शिक्षार्थियों का देश रहा है। प्राचीन समय में भी, भारत को तक्षशिला, नालंद, विक्रमशिला और इसके विद्वानों जैसे विश्वविद्यालयों के लिए पूरे विश्व में माना जाता था। आजादी के समय तक भारत में २० विश्वविद्यालय थे, ५०० कॉलेज लगभग २,३०,००० छात्रों का नामांकन करते थे। स्वतंत्रता के बाद से भारत ने उच्च शिक्षा के आंकड़ों के मामले में

काफी प्रगति की है। दिसंबर २०११-१२ तक यह संख्या बढ़कर ६५९ यूनिवर्सिटी और ३३०२३ कॉलेज हो गई है। केंद्र सरकार और राज्य सरकारें उच्च शिक्षा के विस्तार के लिए विश्वविद्यालयों और कॉलेजों की संख्या पर ध्यान केंद्रित करके प्रतिभा का पोषण करने की कोशिश कर रही है। इस तथ्य में कोई संदेह नहीं है कि शिक्षा में भारत ने जो प्रगति हासिल की है, वह निजी क्षेत्र से आई है। वास्तव में सार्वजनिक क्षेत्र और निजी क्षेत्र एक दूसरे के विरोध में नहीं हैं लेकिन वे भारतीय शिक्षा क्षेत्र में एक साथ काम कर रहे हैं। यूजीसी मुख्य शासी निकाय है जो मानकों को लागू करता है, सरकार को सलाह देता है और केंद्र और राज्यों के बीच समन्वय बनाने में मदद करता है।

भारत में उच्च शिक्षा में चुनौतियाँ :

यह हमारी आजादी का ६९ वाँ वर्ष है फिर भी हमारी शिक्षा प्रणाली पूर्ण रूप से विकसित नहीं हुई है। हम दुनिया के शीर्ष १०० विश्वविद्यालयों में एक भी विश्वविद्यालय को सूचिबद्ध करने में सक्षम नहीं हैं। इन छह दशकों के दौरान विभिन्न सरकारें बदली। उन्होंने शिक्षा प्रणाली को बढ़ावा देने की कोशिश की और विभिन्न शिक्षा नीतियों को लागू किया लेकिन वे ब्रह्मांड के लिए एक उदाहरण देने के लिए पर्याप्त नहीं थे। यु.जी.सी. लगातार काम कर रहा है और उच्च शिक्षा क्षेत्र में गुणवत्तापूर्ण शिक्षा पर ध्यान केंद्रित कर रहा है। फिर भी हम अपनी शिक्षा प्रणाली में बहुत सारी समस्याओं और चुनौतियों का सामना कर रहे हैं। भारत में उच्च शिक्षा प्रणाली में कुछ बुनियादी चुनौतियाँ नीचे दी गई हैं -

- **नामांकन** : उच्च शिक्षा में भारत का सफल नामांकन अनुपात केवल १५% है जो कि विकसित और अन्य विकासशील देशों की तुलना में काफी कम है। स्कूल स्तर पर नामांकन की वृद्धि के साथ, उच्च शिक्षा संस्थानों की आपूर्ति देश में बढ़ती मांग को पूरा करने के लिए अपर्याप्त है।
- **इक्विटी** : समाज के विभिन्न संप्रदायों के बीच जीईआर में कोई इक्विटी नहीं है। पिछले अध्ययनों के अनुसार भारत में पुरुष और महिला के बीच उच्च शिक्षा में जीईआर काफी हद तक भिन्न होता है। क्षेत्रीय, भिन्नताएं भी हैं कुछ राज्यों में उच्च जीईआर है जबकि कुछ राष्ट्रीय जीईआर से काफी पीछे हैं जो उच्च शिक्षा प्रणाली के भीतर एक महत्वपूर्ण असंतुलन को दर्शाते हैं।
- **गुणवत्ता** : उच्च शिक्षा में गुणवत्ता एक बहुआयामी, बहुस्तरीय और एक गतिशील अवधारणा है। उच्च शिक्षा में गुणवत्ता सुनिश्चित करना आज भारत में सामने आ रही चुनौतियों में से एक है। हालांकि, सरकार लगातार गुणवत्तापूर्ण शिक्षा पर ध्यान केंद्रित कर रही है। अभी भी भारत में बड़ी संख्या में कॉलेज और विश्वविद्यालय यूजीसी द्वारा निर्धारित न्यूनतम आवश्यकताओं को पूरा करने में असमर्थ हैं और हमारे विश्वविद्यालय दुनिया के शीर्ष विश्वविद्यालयों में अपनी जगह बनाने की स्थिति में नहीं है।

- **बुनियादी ढांचा :** गरीब बुनियादी ढांचा भारत की उच्च शिक्षा प्रणाली के लिए एक और चुनौती है, विशेष रूप से सार्वजनिक क्षेत्र द्वारा संचालित संस्थान खराब भौतिक सुविधाओं और बुनियादी ढांचे से पीड़ित हैं। बड़ी संख्या में कॉलेज हैं जो जमीन पर या पहली मंजिल पर इमारत की दूसरी या तीसरी मंजिल पर काम कर रहे हैं और वहां रेडीमेड होजरी या फोटोकॉपी की दुकानें मौजूद हैं।
- **राजनीतिक हस्तक्षेप :** अधिकांश शैक्षणिक संस्थान राजनीतिक नेताओं के स्वामित्व में हैं, जो विश्वविद्यालयों के संचालन निकायों में महत्वपूर्ण भूमिका निभा रहे हैं। वे अपने स्वार्थ साधन के लिए निर्दोष छात्रों का उपयोग कर रहे हैं। छात्र अभियान का आयोजन करते हैं, अपने स्वयं के उद्देश्यों को भूल जाते हैं और राजनीति में अपने परिवार को विकसित करना शुरू करते हैं।
- **संकाय :** संकाय की कमी और अच्छी तरह से योग्य शिक्षकों को आकर्षित करने और बनाए रखने के लिए राज्य शैक्षिक प्रणाली की अक्षमता कई वर्षों से गुणवत्तापूर्ण शिक्षा के लिए चुनौती बन रही है। नेट / पीएच.डी उम्मीदवारों की बड़ी संख्या में बेरोजगार हैं यहाँ तक कि उच्च शिक्षा में बहुत सारी रिक्तियाँ हैं, ये योग्य उम्मीदवार फिर अन्य विभागों में आवेदन कर रहे हैं जो उच्च शिक्षा प्रणाली के लिए सबसे बड़ा झटका है।
- **अनुसंधान और नवाचार :** हमारे देश में बहुत मामूली विद्वान् हैं जिनके लेखन का उल्लेख प्रसिद्ध पश्चिमी लेखकों द्वारा किया जाता है। उच्च शिक्षा संस्थानों में अनुसंधान पर अपर्याप्त ध्यान केंद्रित किया गया है। अपर्याप्त संसाधन और सुविधाएं हैं, साथ ही छात्रों को सलाह देने के लिए सीमित संख्या में गुणवत्ता संकाय भी हैं। अधिकांश शोध विद्वान बिना फेलोशिप के होते हैं या समय पर उनकी फेलोशिप प्राप्त नहीं कर रहे हैं जो प्रत्यक्ष या अप्रत्यक्ष रूप से उनके शोध को प्रभावित करता है। इसके अलावा, भारतीय उच्च शिक्षा संस्थान खराब रूप से अनुसंधान केंद्रों से जुड़े हुए हैं। इसलिए, यह भारत में उच्च शिक्षा के लिए चुनौती का एक और क्षेत्र है।
- **उच्च शिक्षा की संरचना :** भारतीय शिक्षा का प्रबंधन अति-केंद्रीकरण, नौकरशाही संरचनाओं और जवाबदेही, पारदर्शिता और व्यावसायिकता की कमी की चुनौतियों का परिणामस्वरूप, विश्वविद्यालयों के प्रशासनिक कार्यों का बोझ काफी बढ़ गया है और शिक्षा और अनुसंधान पर मुख्य ध्यान केंद्रित किया गया है (कुमार २०१५)।

उच्च शिक्षा में अवसर :

भारत एक बड़ा देश है, जिसकी अनुमानित जनसंख्या १८ से २३ वर्ष के बीच की आयु के लोगों की संख्या लगभग १५० मिलियन है। बाजार का सरासर आकार भारत में उच्च शिक्षा क्षेत्र के विकास के लिए विशाल अवसर प्रदान करता है। भारत में अब ३३,००० से अधिक महाविद्यालय और ६५९ विश्वविद्यालय हैं, जो पिछले छह दशकों के दौरान काफी उल्लेखनीय वृद्धि हुई है। वर्ष २०१२ में २१.४ मिलियन नामांकन हुए, जो भारत को दुनिया की तीसरी सबसे बड़ी शैक्षिक प्रणाली बनाता है

। दुर्भाग्य से, इस तरह के विशाल मात्रा को संभालने के लिए भारत का शैक्षिक बुनियादी ढांचा अपर्याप्त है। शैक्षिक क्षेत्र में सभी सरकारी खर्चों के बावजूद, बढ़ती आवश्यकताओं को पूरा करने के लिए यह बहुत अपर्याप्त है। इसलिए, उच्च शिक्षा क्षेत्र को अब निजी और विदेशी निवेश के लिए एक आशाजनक क्षेत्र के रूप में पहचाना गया है। यह गैर विनियमित और विनियमित खंड (नेक्सस नोवस, २६ जुलाई, २०१२३) दोनों में भारी निवेश के अवसर प्रदान करता है।

भारतीय उच्च शिक्षा प्रणाली विभिन्न चुनौतियों के बावजूद बहुत तेजी से बढ़ रही है लेकिन कोई कारण नहीं है कि इन चुनौतियों को दूर नहीं किया जा सकता है। नए युग के शिक्षण उपकरणों की मदद से, भारत जैसे देश के लिए इन समस्याओं को दूर करना और देश के उच्च शिक्षा क्षेत्र में प्रतिमान बदलाव लाना आसान है। इस तरह के एक जीवंत देश के साथ बड़ी आबादी अच्छी तरह से शिक्षित है, संभावनाएँ अनंत हैं। यदी ज्ञान को उन्नत डिजिटल शिक्षण और शिक्षण उपकरणों का उपयोग करके प्रदान किया जाता है और समाज को इस बात से अवगत कराया जाता है कि हम वर्तमान में कहां पिछड़ रहे हैं, तो हमारा देश आसानी से दुनिया के सबसे विकसित देशों में से एक बन सकता है।

राज्य स्तर पर उच्च शिक्षा नेतृत्व और प्रबंधन में रणनीतिक सहभागिता और क्षमता निर्माण के अवसर हैं। भारत में प्रणालीगत सुधार के क्षेत्रों में राष्ट्रीय और अंतर्राष्ट्रीय स्तर पर सहयोग करने के अवसर हैं, जिनमें गुणवत्ता आश्वासन, अंतर्राष्ट्रीय ऋण मान्यता और एकीकृत राष्ट्रीय योग्यता ढांचा शामिल हैं। उच्च शिक्षा में शैक्षिक अवसर की समानता को आवश्यक माना जाता है। क्योंकि उच्च शिक्षा आय और धन असमानताओं को कम करने या समाप्त करने का एक शक्तिशाली उपकरण है। शैक्षिक अवसरों की बराबरी करने का विचार भी इस तथ्य में निहित है कि "उच्च शिक्षा द्वारा लाभ की क्षमता लोगों के सभी वर्गों में फैल हुई है। समाज में अप्रयुक्त क्षमता के महान भंडार हैं, ; यदि मौका दिया जाए तो वे शीर्ष पर पहुंच सकते हैं। उच्चतम स्तर की प्रतिभा का एक बड़ा सौदा वास्तव में, शिक्षा की एक असमानता प्रणाली से हार गया है" (बालचंद्र, १९८६)

स्नातकों की रोजगार क्षमता को बढ़ाने की आवश्यकता उद्यम शिक्षा और उद्यमिता, उद्योग के साथ लिंक, अनुसंधान कौशल और अंग्रेजी सहित हस्तांतरणीय कौशल की विस्तृत श्रृंखला में सहयोग के लिए प्रवेश बिंदु प्रस्तुत कर रही है। व्यावसायिक कौशल बाजार में भारतीय उच्च शिक्षा संस्थानों में उभरती रुचि अंतर्राष्ट्रीय भागीदारों के साथ संभावित जुड़ाव के लिए क्षेत्र प्रदान करती है। प्लेटफार्मों (सम्मेलनों, कार्यशालाओं, सेमिनारों) में समर्थन और भागीदारी बढ़ाकर उच्च शिक्षा में मजबूत संबंध बनाने और आपसी समझ बढ़ाने की आवश्यकता है जो दुनिया के अन्य देशों के साथ बहस और बातचीत को सक्षम बनाते हैं। (ब्रिटिश काउंसिल, २०१४)।

उच्च शिक्षा प्रणाली में सुधार के सुझाव :

- विश्व स्तर पर भारतीय शैक्षिक प्रणाली को और अधिक प्रासंगिक और प्रतिस्पर्धी बनाने के लिए प्राथमिक और उच्च शिक्षा स्तर पर नवीन और परिवर्तनकारी दृष्टिकोण को लागू करने की आवश्यकता है।
- उच्च शैक्षणिक संस्थानों को गुणवत्ता और प्रतिष्ठा में सुधार करने की आवश्यकता है।
- कॉलेजों और विश्वविद्यालयों का एक अच्छा बुनियादी ढांचा होना चाहिए जो छात्रों को आकर्षित कर सके।
- सरकार को भारतीय उच्च शिक्षा संस्थानों और शीर्ष अंतर्राष्ट्रीय संस्थानों के बीच सहयोग को बढ़ावा देना चाहिए और बेहतर गुणवत्ता और सहयोगात्मक अनुसंधान के लिए राष्ट्रीय अनुसंधान प्रयोगशालाओं और शीर्ष संस्थानों के अनुसंधान केंद्रों के बीच संबंध भी उत्पन्न करना चाहिए।
- स्नातक छात्रों को ऐसे पाठ्यक्रम प्रदान करने पर ध्यान केंद्रित करने की आवश्यकता है, जिसमें वे उत्कृष्टता प्राप्त कर सकें, विषय का गहन ज्ञान प्राप्त कर सकें, ताकि कंपनियों में भर्ती होने के बाद उन्हें नौकरी मिल जाए जिससे उच्च शिक्षा के लिए अनावश्यक भीड़ कम हो।
- दोनों सार्वजनिक निजी विश्वविद्यालयों और कॉलेजों को राजनीतिक संबद्धता, फेवरिटिज्म, मनी मेकिंग प्रक्रिया से दूर होना चाहिए।
- उच्च शिक्षा में एक बहु-विषयक दृष्टिकोण होना चाहिए ताकि छात्रों का ज्ञान केवल अपने ही विषयों तक सीमित न हो।

निष्कर्ष :

शिक्षा एक ऐसी प्रक्रिया है जिसके द्वारा किसी व्यक्ति के शरीर, मन और चरित्र का निर्माण और उसे मजबूत किया जाता है। यह सिर, दिल और दिमाग को एक साथ ला रहा है और इस प्रकार एक व्यक्ति को एक सर्वांगीण व्यक्तित्व विकसित करने में सक्षम बनाता है जो उसके या उसके सबसे अच्छे व्यक्ति की पहचान करता है। भारत में उच्च शिक्षा ने स्वतंत्रता के बाद पिछले छह दशकों में बहुत तेजी से विस्तार किया है फिर भी यह सभी के लिए समान रूप से सुलभ नहीं है। भारत आज दुनिया के सबसे तेजी से विकासशील देशों में से एक है जिसकी वार्षिक वृद्धि दर ९% से ऊपर है। अभी भी आबादी का एक बड़ा वर्ग निरक्षर है और बड़ी संख्या में बच्चों को प्राथमिक शिक्षा भी नहीं मिलती है। यह न केवल आबादी के एक बड़े हिस्से को देश के विकास में पूरी तरह से योगदान देने से बाहर रखा गया है, बल्कि इसने उन्हें लोगों के लाभ के लिए जो भी विकास हुआ है उसका लाभ उठाने से भी रोका है। इसमें कोई संदेह नहीं है कि भारत उच्च शिक्षा में विभिन्न चुनौतियों का सामना कर रहा है लेकिन इन चुनौतियों से निपटने के लिए और उच्च शिक्षा को बढ़ावा देना अत्यंत महत्वपूर्ण है। भारत एक विशाल मानव संसाधन क्षमता का देश है, इस

क्षमता का सही उपयोग करना वह मुद्दा है जिस पर चर्चा करने की आवश्यकता है। अवसर उपलब्ध हैं लेकिन इन अवसरों से लाभ कैसे प्राप्त करें और उन्हें दूसरों तक कैसे पहुंचाया जाए यह चिंता का विषय है। विकास दर को बनाए रखने के लिए, संस्थानों की संख्या और भारत में उच्च शिक्षा की गुणवत्ता को बढ़ाने की आवश्यकता है। भविष्य की आवश्यकताओं को प्राप्त करने के लिए वित्तीय संसाधनों, पहुंच और इक्विटी, गुणवत्ता मानकों, प्रासंगिकता, बुनियादी ढांचे और अंत में जवाबदेही पर ध्यान देने की तत्काल आवश्यकता है।

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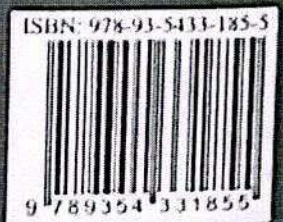
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A Tribute to ...

Swami Vivekananda

to it. In a nutshell, Lahiri has very well constructed the matrimonial world of Shoba and Shukumar, proving details of the human life and of husband-wife relationship and how children- dead or alive affect a couple's life.

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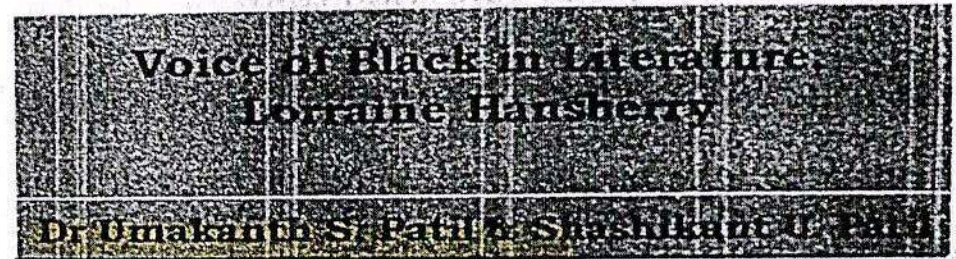
Bahareh Bahmanpour, "Female Subjects and Negotiating Identities in Jhumpa Lahiri's *Interpreter of Maladies*" *Journal Studies In Literature and Language* Vol. 1, No. 6, 2010, pp.43-51.

Guha Rajdeep "Family Relationships In Jhumpa Lahiri's *The Namesake* And Kiran Desai's *The Inheritance Of Loss*" A Thesis Submitted For The Degree Of Master Of Arts At The University Of Otago, Dunedin, New Zealand 19th December 2012.

Lahiri, Jhumpa. "A Temporary Matter" the story published in "The Interpreter Of Maladies" New York: Houghton Mifflin, 1999.

Mishra Saurabh article on "Man-Woman Relationships: A Bicultural Syntax In The Short Stories Of Jhumpa Lahiri" ISSN: 0974-892X VOL. I ISSUE I January 2007.

Naik Shamrao "Love, Marriage And Sexual Relations: Man-Woman Relationship In Jhumpa Lahiri's *The Namesake*" *Research Spectrum*: Vol: 3, Issue: 2, August 2012.



Abstract:

Lorraine Hansberry deliberately chose realism which suited her purpose. She said, 'the realistic playwrights states not only what is, but what can and should be'. It is important to remember that she was essentially an American. But still, some continue to deny this identity and her ambivalence. She was a particular American- a Black female American writer who grew up in a comfortable home on the south side of Chicago. In her singularity, in her particularity, she was a voice

Dr Umakanth S. Patil: Associate Professor, Karnataka College, Bidar (KS) India.

Shashikant U. Patil: Satyaneketan College, Bhalki (KS) India.

Classification of Documents based on Local Binary Pattern Features through Age Analysis



Pushpalata Gonasagi, Rajmohan Pardeshi and Mallikarjun Hangarge

Abstract A method for identifying the age of a document using local binary pattern (LBP) features is presented here. The paper documents are the most important source of information which has been using for communication, record maintenance and proof for smoothing. A paper document is a sheet used for writing or printing something on it. We have been using a large amount of paper documents in day today life. Watermarking, embedding signatures and printed patterns have been using to secure legal documents; however, due to the misuse of digital technology, several challenges related to document security is raised. To address this problem, document age identification is one of the significant steps used to identify document's authenticity/originality. In this paper, 500 printed documents which are published during 1993–2013 are used for identifying as new or old documents based on their year of publication. We have considered whole document for study irrespective of the content like text, line, logo, noise, etc. Initially, we have segmented a document page into 512×512 blocks and retained those text blocks which are covered with full text. Later, applied LBP technique on these text blocks and extracted features. These features are fed to k-nearest neighbors (KNN) classifier and average classification accuracy achieved is 91.5%.

Keywords Local binary patterns (LBP) · K-nearest neighbor (KNN) · Document age identification

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1 Introduction

In our daily life, paper documents are playing a vital role in keeping the records such as birth certificates, death certificates, identity cards, official documents, etc. But as digital technology has been growing, the concern about the authenticity of these paper documents is increasing. Even though watermarking system, printing pattern, logo, etc., are applied during production of documents but still security problems exist. Document classification based on its age is important task in forensic science. As a document becomes older or aging, color of the document changes. The color and background of the document depend on humidity, environment, storage conditions, temperature, frequently access, etc. Paper documents may have been generated in many centuries, decades, years, and months ago. In fact, paper manufacturing technologies, printing technologies, and paper quality have been changing with time. Besides, printed documents can be modified by using digital technology, such as Adobe Photoshop, Gimp, Color printer for malicious purposes. In this context, investigation for the document uniqueness is essential for several purposes. We present a method to deal with document age identification using LBP to support the forensic science experts in analyzing the authenticity of the documents.

The organization of the rest of the paper is as follows: Sect. 2 describes related work, Sect. 3 presents proposed method, Sect. 4 contains results and discussion, and Sect. 5 concludes the contributions of the proposed work.

2 Related Work

A number of research works have been carried out to classify the handwritten and printed documents as old and new based on their aging to support the investigation documents originality. Here, we have presented a brief review of the work pertaining to the documents classification based on their aging. Raghunandan et al. [1] explained identification of the documents as old and new based on the quality of the documents. They have used foreground and background information of handwritten documents as well as Fourier co-efficient features. The authors carried out the experimental study on their own dataset and achieved an accuracy of 78.5% for new documents and 77.5% for old documents. He et al. [2] proposed a method for historical document dating using scale-invariant features. Stroke shape elements of historical documents and evolutionary self-organizing map are discovering to identify the evolution of visual elements along the time line. This method achieved accuracy of 85.1%. Li et al. [3] presented a method to estimate publication dates of printed historical documents. They proposed hybrid model which employs image and text data both, they used Convolutional Neural Network (CNN) and Word Embedding. The same model further employed for Classification and Regression Tasks. They achieved text models are better than image models and combined models are better than both model. Khan et al. [4] presented a method which demonstrates the use of hyper-spectral imaging

for fraud handwritten document analysis. Ink mismatches of handwritten documents are detected. But illicit purpose created same handwritten document using advance software which satisfied the characters of the original documents. Biswajit et al. [5] proposed a method to determine ink age of printed documents. This system is based on the color image analysis by finding the average intensities, pixel profile and kurtosis of the image. These features are used for ink age identification of the unknown samples. Google Life magazine cover pages were considered as dataset. Neural network is designed for ink age identification and achieved the recognition accuracy as 74.5%.

da Silva Barboza et al. [6] this article identifies the age of the document based on the RGB color components of documents background. The birth, wedding cards and other certificates of twentieth century were considered for experimentation. They have considered the document images for experimentation with a fifty-two years gap of each other and noticed encouraging results.

Gebhardt et al. [7] presented a system that differentiates the document from the bundle of documents which are printed with different printers. Different printers have different impact of printing the characters. With this clue, they have identified the forgery documents. They have noticed the changes in the edges of printed characters of laser printer and inkjet printer. They used unsupervised anomaly Grubb's test and global KNN algorithm to classify the documents printed using laser and inkjet printers.

Bertrand et al. [8] described a method that automatically detects the forgery of characters. The copy and paste techniques which are commonly used to make the documents forgery are identified. The copy and paste characters are detected through similarity checking between the characters. To detect the simulation forgery, they identified the unusual shapes of characters. They achieved the results as 0.77 recalls and 0.82 precision.

3 Proposed Method

The pre-processing, feature extraction and classification of the documents are three important steps performed in this method. The block diagram of the proposed method is depicted in Fig. 1.

3.1 Pre-processing

Basically, we have collected 100 document pages from five books which are printed in 1993, 1998, 2003, 2008 and 2013 (20 pages of each book). These documents are scanned by HP flatbed model LaserJetProM128fn scanner with resolution of 300 dpi. These scanned images are converted to gray-level images and then segmented them as

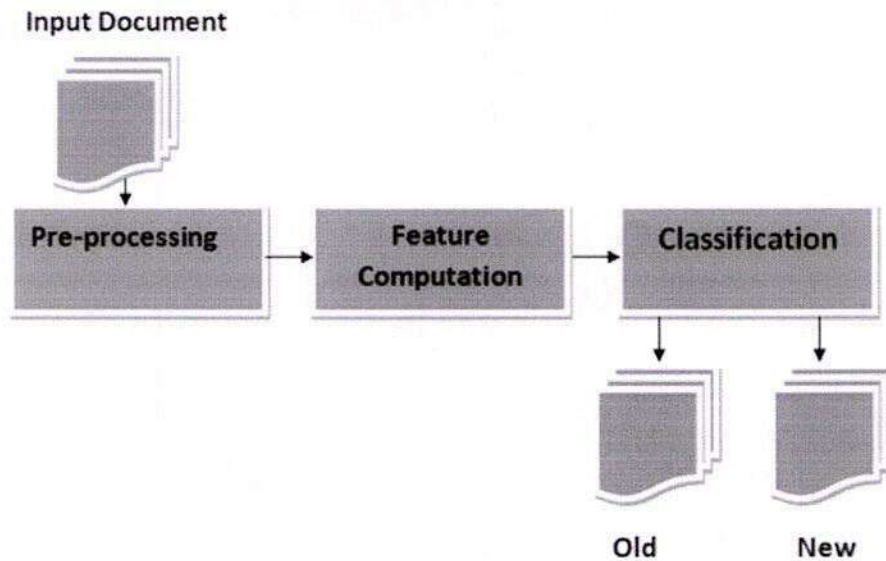


Fig. 1 Flow diagram of proposed method

Table 1 Details of the dataset developed for experiments

Year	No. of images	No. of text blocks extracted
2013	20	112
2008	20	111
2003	20	113
1998	20	140
1993	20	104
Total	100	580

512 × 512 pixels text blocks and retained only those blocks which are fully covered by the text. The details of dataset are presented in Table 1.

3.2 Feature Extraction

Local Binary Pattern: It is one of the efficient texture descriptors. LBP [9, 10] measures local spatial patterns and gray scale contrast of the underlying texture. It is robust for computing monotonic gray scale changes in the image. Rotation invariant is the basic property of the LBP. Thus, we choose LBP to obtain proficient texture descriptors of text blocks. In number of applications, it has been proved that LBP is more robust than statistical texture features. We extract the features of the text blocks using LBP ($P = 8, R = 1$). This yields a text block with 256 patterns. Among these, 58 patterns are uniform and each non-uniform are signed as single code which gives total 59 different patterns. Mathematically, LBP can be expressed as shown in Eq. 1.

$$\text{LBP}_{P,R} = \sum_{p=0}^{P-1} S(g_p - g_c) 2^p \text{ where } S(x) \begin{cases} 1 & \text{if } x \geq 0 \\ 0 & \text{if } x < 0 \end{cases} \quad (1)$$

Where, P indicates sampling points on a circle of radius R ($P = 8, R = 1$), g_c corresponds to the gray value of the center pixel and g_p corresponds to the gray values of its neighbor pixel p .

3.3 Classification

K-nearest neighbor (KNN) [11] is simple and lazy classifier, even though we have employed it to identify the age of documents. Instead of sophisticated classifiers, we preferred it because LBP features are more discriminative in nature. This simple classifier has given encouraging results.

4 Results and Discussion

For experimentation, we have considered documents printed in 2013 as new and the documents which are printed in 2008, 2003, 1998 and 1993 are as old. We have designed two class problems and employed KNN to compute the distance between the feature vectors of documents printed in 2013 with feature vector of documents printed in 2008, 2003, 1998 and 1993, respectively. The classification accuracy is presented in Table 2.

The classification accuracy shown in Table 2 reveals interesting results that as the aging gap increases between the documents, accuracy also increases. This is because the aging of documents printed in 1993 is 20 years older than documents of 2013. Hence, the classification accuracy presented in Table 2 is 98.5%. Similarly, the aging gap between the documents printed in 2013 and 2003 is ten years. Therefore,

Table 2 Classification accuracy by considering documents of 2013 as new and others as old

Year (new/old document)	2008	2003	1998	1993
2013 (%)	87.5	92	95.5	98.5

Table 3 Classification accuracy by considering documents of 2013 as new and others as old

Accuracy	New documents (2013)	Old documents (1993–2008)
New documents (2013) (%)	87.5	12.5 (error)
Old documents (1993–2008) (%)	05 (Error)	95

Table 4 Classification rate of the proposed system without block-wise dataset compared to existing approach

Method	New documents (%)	Old documents (%)
Raghunandan et al. [1]	78.5	77.5
Proposed method	87.5	95

similarity between the documents of 2013 and 2008 is more; therefore, less accuracy is noticed that is 87.5%. The confusion rate of the classifier is shown in Table 3. The comparative analysis of the results with the reported work is not significant as there is no similarity in experimental environment (different dataset, method and number of features). Moreover, there is no age identification work reported on documents of Kannada script. However, a numeric comparative analysis is shown in Table 4 with the work cited at [1]. This work is carried out on handwritten documents age identification with different age gaps.

5 Conclusion

In this paper, we proposed a novel approach for classifying documents as new and old. The LBP has shown remarkable results in discriminating the text blocks as new and old. LBP efficiently captured texture properties of the documents and yielded high-discriminating features. Document age identification research is carried out to study the nature of the documents to validate its originality. In addition to this, we are extending this work to find the printing technologies used to produce the documents. Also we are extending it to identify the age of the handwritten documents. In the future, we validate the performance of the proposed algorithm when it is applied on the documents of different (printed and handwritten) scripts, font styles and font sizes.

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DWT-LBP Descriptors for Chest X-Ray View Classification



Rajmohan Pardeshi, Rita Patil, Nirupama Ansingkar, Prapti D. Deshmukh and Somnath Biradar

Abstract In this paper, we have attempted the problem of chest X ray Image view classification. To do this, we have applied three steps pre-processing, feature computation and classification. Image enhancement based on histogram equalization is carried out in pre-processing. For computing the features hybrid method based on Discrete Wavelet Transform and Uniform Local Binary Pattern is developed and SVM used for classification. We have got encouraging results on NIH dataset with accuracy of 98.00% using 10 fold cross validation.

Keywords Discrete wavelet transform · Local binary patterns · Chest X-ray · View classification · Support vector machines · Cross-validation

1 Introduction

The last decade witnessed tremendous growth of information technology in the medical imaging applications. Easy availability of digital medical imaging devices created mountains of medical imaging data, which is waiting for its processing and analysis. Among the many available modalities Chest x-ray is becoming more popular due to its easy usability and low cost. Automatic Chest X-ray analysis has several applications such as detecting abnormalities, screening of different diseases such as Pneumonia [1], tuberculosis [2] etc. For screening of disease, inspection of both lateral and frontal views of Chest X-ray is carried out by radiologist. But in an automatic system it is first required to identify the view for further analysis, because

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the analysis procedures for the both views are significantly different. Therefore identifying the view of Chest x-ray image is significant pre-cursor to Computer Aided Diagnosis (CAD) system. By motivating from this factor, we have presented an approach, for Chest X-ray Image View Classification.

The remainder of the paper is structured as follows: In Sect. 2 we have presented related work. In Sect. 3 we have briefed our method and Sect. 4 dedicated for experiments and discussion. We concluded in Sect. 5.

2 Related Work

Automatic analysis of chest x-ray images have received the large attention in past years and several algorithms are presented by authors, but very few are focused on view classification problem.

Maximum-Minimum profile length ratio based method is presented in [3] for chest X-Ray Orientation Estimation. They have considered eight directions for estimation of orientation of chest x-ray. In [4] authors developed algorithm for orientation estimation of chest X-ray images using the projection profile based features and neural network. Authors presented a scheme based on template matching for classification of posteroanterior (PA) and lateral views of chest X-rays [5]. Authors in [6] presented a scheme for view classification of chest radiographs, to do this, they have reduced the input image to size of 32×32 and 8×8 pixels and intensity values of reduced images are considered as features. Further, Nearest Neighbor Classifier, Tangent distance and Cross Correlations is considered for classification task. In [7] authors explored the impact of image features size with various distance measures. They have considered the image size of 1×1 , 2×2 , 4×4 , 8×8 , 16×16 , 32×32 , 64×64 for feature computation and K-Nearest Neighbor Classifier was applied with different distance functions for classification. Projection profiles based measures namely body symmetry index and background percentage index is computed from input chest radiographs in [8], these feature fed into linear discriminant analysis classifier for view classification. In [9] authors presented three novel features for classification chest radiographs namely tilt angle of the scapula superior border, the tilt angle of the clavicle and the extent of radiolucence in lung fields which are further fed into linear discriminant analysis for view classification. Authors in [10] developed a method for classification of chest x-ray view, they have employed several features such projection profiles, Body size ratio, Pyramidal Histogram of Oriented Gradients, Contour based shape features and meta classifier with attribute feature selection is applied for the task of classification. In [11] authors presented Force Histogram Descriptors for classification of chest radiograph view with three classifiers namely Support Vector Machines, Random Forest and Multilayer Perceptron.

From the above aforementioned paragraph, we can see that, most of the methods have employed profile based features and local descriptors which are dependent on clean image quality and few of them requires image to be binarized. In this work, we have presented a hybrid method based Discrete Wavelet Transform and Local Binary

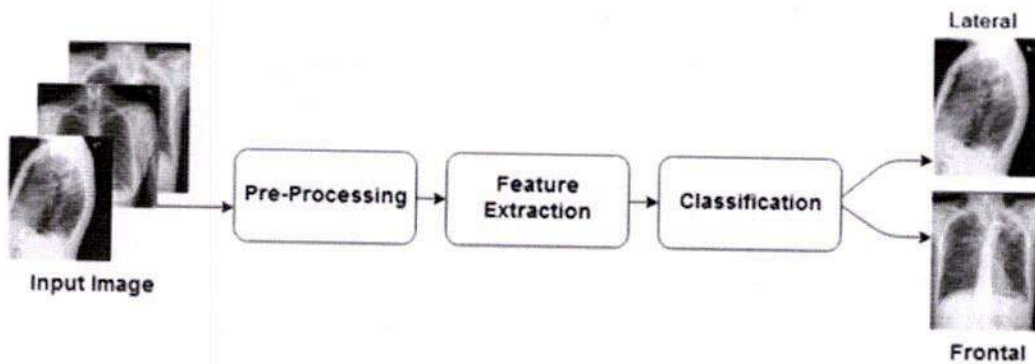


Fig. 1 Schematic diagram of proposed method

Patterns for Feature Extraction for efficient representation of chest radiographs. To exhibit the efficacy of our features we have applied linear support vector machine classifier during the view classification phase.

3 Proposed Method

In this work, our aim is to automatically identify the view of input chest x-ray image. This is one of the important pre-cursor step towards development fully automatic chest x-ray image analysis system for automatic disease screening. To achieve this, we have employed the three steps pre-processing, Feature Computation and classification. During preprocessing we have applied Contrast Limited Adaptive Histogram Equalization (CLAHE) for image enhancement. For feature extraction, we have presented a hybrid scheme by combining Discrete Wavelet Transform (DWT) and Local Binary Patterns (LBP). During Classification stage, we have employed the Support Vector Machine Classifier. Schematic Diagram of our method is shown in Fig. 1.

3.1 Pre-processing:

Pre-processing steps are essential to achieve the better image representation and these steps are different for different applications. In our case, we have to analyze the chest x-ray image which consist of bone structures having dynamic range of intensity values. To achieve the better view, simple image enhancement operation as pre-processing step is considered. To enhance the input chest x-ray image we have employed the basic histogram equalization operation, by which the input grayscale image is enhanced.

3.2 Feature Extraction:

Discrete Wavelet Transform: The concept of multiresolution theory was first introduced by Mallat [14]. Wavelets were considered to be the powerful tool for the signal or image processing and analysis. A scaling function is used in creation of a series of approximations of a function or image by a factor of 2 in resolution from its nearest neighboring approximations. Its Complementary functions are called as Wavelets. These wavelets are used to encrypt the differences between adjacent approximations. The wavelets with single scaling functions are used by Discrete Wavelet Transformation which serve as an orthonormal basis of the DWT expansion.

Two dimensional scaling function represented as $\varphi(a, b)$, and three 2-D wavelets represented as $\psi^H(a, b)$, $\psi^V(a, b)$, $\psi^D(a, b)$, these are the products of one dimensional scaling and wavelet, which can be represented by:

$$\psi^H(a, b) = \varphi(a)\psi(b) \quad (1)$$

$$\psi^V(a, b) = \psi(a)\varphi(b) \quad (2)$$

$$\psi^D(a, b) = \varphi(a)\varphi(b) \quad (3)$$

These wavelets measure the functional variations—changes in the intensity in images along different directions. Equation (1) measures variations along columns. Equation (2) calculates the variation along rows. Equation (3) corresponds to diagonal variations. 2D DWT can be implemented by using digital filters.

Local Binary Patterns are one of the efficient texture descriptors which transform input image into an image of integer labels describing the small-scale spatial texture of an image [12]. Local binary patterns can be extended with little modifications, while grouping the decimal values in histogram bins. In our process of feature computation we have used uniform local binary patterns, which are summarized as: Input image is converted into binary image, then 3×3 window is considered around each pixel as neighborhood. If input binary string has more than 2 transitions, then it is considered as non-uniform code otherwise uniform code. In this way only uniform codes without considering rotation information are considered as feature.

DWT-LBP Descriptors: First Input Image is divided into two parts vertically, then each part of Image is decomposed using Discrete Wavelet Transform and detail sub bands representing Vertical, Horizontal and Diagonal energies. In this way, we have got total 6 sub bands, from each sub band then we have computer Uniform Local Binary Pattern of 10 dimension and hence obtained $6 \times 10 = 60$ dimension feature vector. For better understanding, the process is presented in diagrammatic form in Fig. 2.

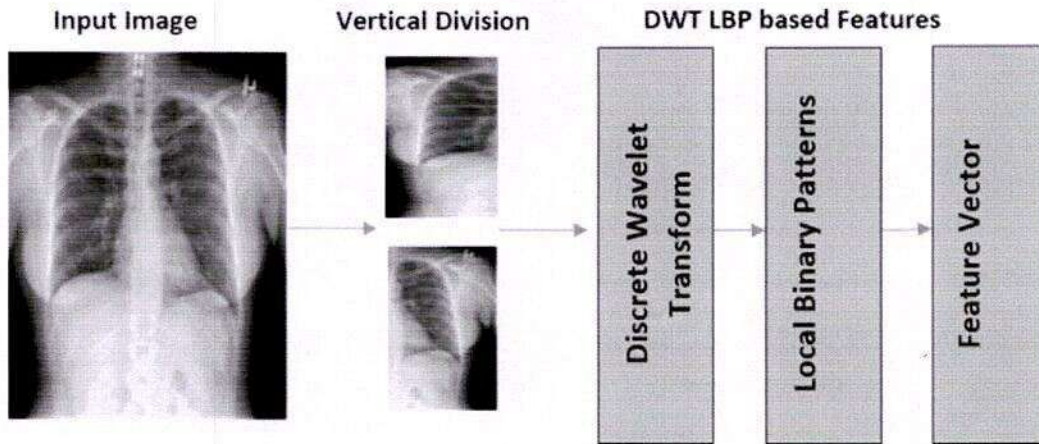


Fig. 2 Schematic diagram of proposed method

3.3 Classification:

Support Vector Machine is one of the popular algorithm in machine learning for the task of classification and regression. It belongs to family of supervised learning algorithms works on statistical learning theory, proposed by Vapnick [13]. The main idea of SVM is it tried to find linear decision surface by transforming the data into hyperplane, where separation between two classes can be achieved efficiently.

Given training data $\vec{X}_1, \vec{X}_2, \dots, \vec{X}_n \in R_n$, feature vectors of input chest x-ray images, with labels $y_1, y_2, \dots, y_n \in +1, -1$, where $+1$ is frontal view and -1 is lateral view of chest x-ray image. The linear classifier tries to separate instances by maximizing the margin between two linearly separable classes by discriminant function $\vec{w} \cdot \vec{x} + b = 0$ in addition we have imposed constraints so that all instances are correctly classified. In our case:

$$\vec{w} \cdot \vec{x} + b \leq -1 \text{ if } y_i = -1 (\text{lateral view}) \quad (4)$$

$$\vec{w} \cdot \vec{x} + b \geq +1 \text{ if } y_i = +1 (\text{frontal view}) \quad (5)$$

Further, we have extended linear SVM by applying the Cubic Kernel function in our classification problem.

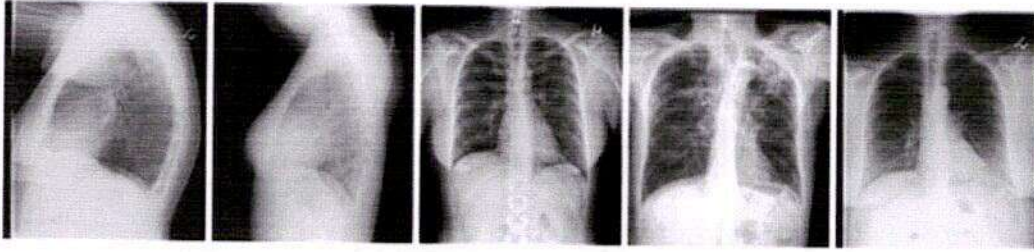


Fig. 3 Samples of chest radiographs from NLM-NIH CXR dataset

4 Experiments

4.1 Dataset and Evaluation Protocol:

To evaluate our proposed method, we have used the publically available Chest X ray data set from National Institute of Health, USA. Total 7470 image which comprises 3821 Frontal View and 3649 Lateral View are considered in our experiments. Some samples from the dataset are shown in Fig. 3.

To estimate the genrilized error of our method, we have applied 10 fold cross validation technique instead of traditional classification training-testing procedure. At the beginning, the complete data set is divided into 10 subparts. Each part given the opportunity to serve as training and testing, when one serves as test set other subparts serves as training set. This method is repeated 10 times, in such way that each sub part will serve for both training as well as for testing. The classification accuracy can be given by:

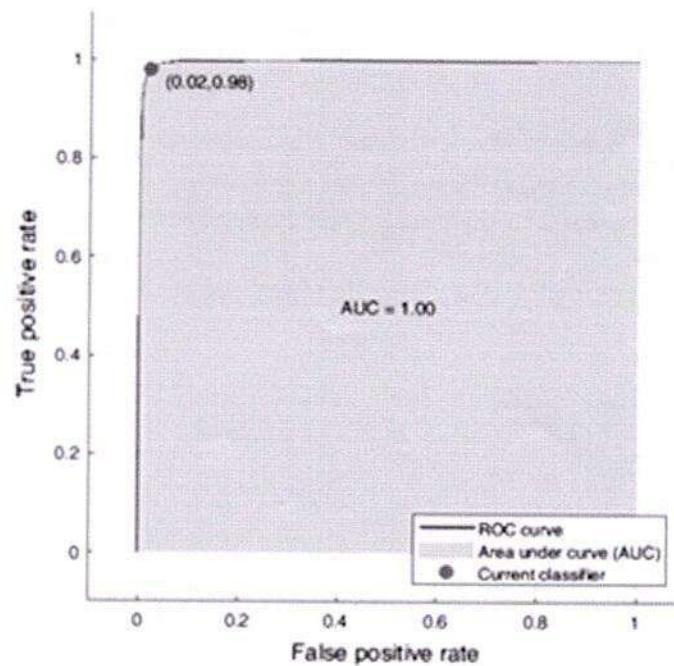
$$Accuracy = \frac{Total\ Correctly\ Classified\ Chest\ Radiographs}{Total\ Radiographs} \quad (6)$$

4.2 Results and Discussion

Results: Using tenfold cross validation with Cubic Support Vector Machine we have evaluated the efficiency of DWT LBP descriptors for the task of chest x-ray view classification. We have presented the results for chest x-ray view classification in Table 1. From the Table 1 it can be noted that, we have received 98% accuracy for both the classes i.e. Frontal and Lateral views. 2% error rate is noted, which can be further improved. For in depth analysis, in Fig. 4 we have presented. Receiver Operating Curve (ROC) for the chest- x-ray view classification. The AUC values justifies the better performance of our method. We have also compared our work with recently reported previous work in Table 2. Xue et al. [10] presented an approach for view classification of chest x-ray images based on combinations of several features, with SVM classifier, but it requires large dimension of features, we have achieved

Table 1 Accuracy in % for classification of chest X-ray view based on DWT LBP descriptors

Chest X-Ray view	Accuracy (%)
Frontal	98
Lateral	98
Average	98

Fig. 4 ROC Curve for Chest X-ray view classification using DWT-LBP descriptors**Table 2** Comparison with recent previous work

Method Proposed by	Feature Extraction Technique	Feature Dimension	Accuracy in %
Xue et al. [10]	Image profile + Contour-based shape feature + Pyramid of histograms of orientation gradients	1276	99.90
Santosh et al. [11]	Angular relational signature	32	99.86
Proposed method	DWT LBP descriptors	60	98.00

slightly low accuracy with only 5% of its feature dimension. Santosh et al. [11] presented angular relational signature based feature descriptor and evaluated with SVM, MLP and RF classifiers. Their method is effective and simple but requires the binarization, which is quite difficult when considering low resolutions and noisy images. Our method is based on multiresolution analysis therefore it is immune to noise and also does not requires much preprocessing.

5 Conclusion

Identifying the correct view of input chest x-ray is very essential step for fully automatic Computer Aided Diagnosis system. In this paper, we have presented hybrid feature descriptors based on Discrete Wavelet Transform and Local Binary Patterns. Support Vector machine with cubic kernel is employed for the classification task. The efficacy of our method is evaluated with large publically available dataset of 7470 images of chest x-ray from U.S. National Library of Medicine (NLM), National Institutes of Health (NIH) and achieved the 98% accuracy. In future, we planned to evaluate the different deep learning algorithms for the task of Chest-x ray view classification by considering the pediatric chest x-rays.

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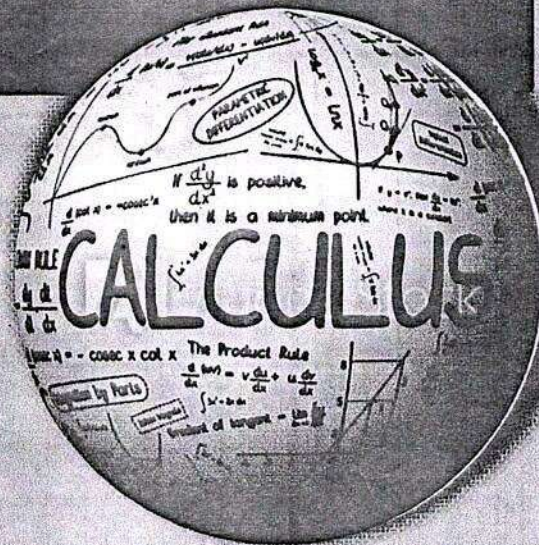
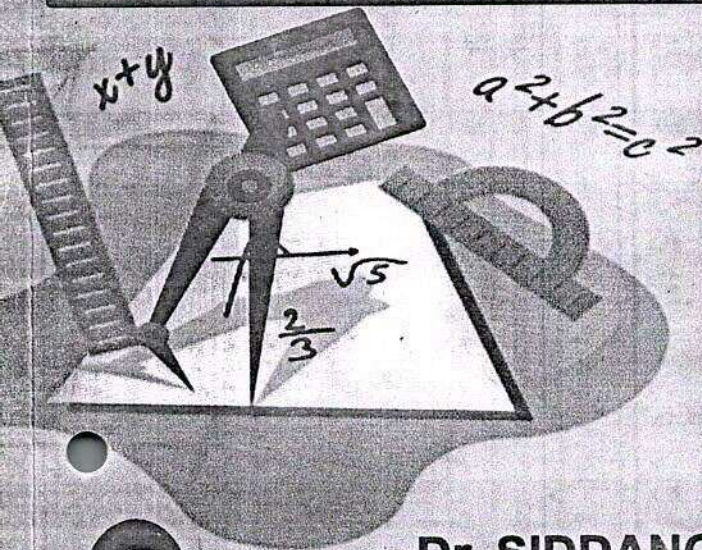
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PREFACE

The Government of Karnataka has introduced the new NEP (National Education Policy) for Under Graduate Courses from the academic year 2021-22 onwards. Accordingly, the syllabus has been revised by all the Universities of Karnataka.

The book Mathematics-II is written for B.Sc., Second Semester students who choose Mathematics as a Major/Discipline Specific Core Course. The subject matter presented in this book is a more straightforward way. This book is self-explanatory to meet the requirements and expectations of a student.

A sincere effort has been taken to make this book error free in all aspects. The study material is presented in such a way that the students and teachers will feel more comfortable. The book also includes Laboratory Manual, which covers Programs written with Maxima code.

I express my profound gratitude to my teacher Dr N.B Naduvinamani, Professor, Department of Mathematics and Finance Officer, Gulbarga University, Kalaburagi, who is the source of inspiration to write this book.

I express my sincere gratitude to Dr S.S. Hatti, Principal, Government College (Autonomous), Kalaburagi. I extend my thanks to Prof. S.B. Golle, HOD Dept. of Mathematics and also express my gratitude to Mr Vithal Singh, Dr Anuradha Bandi, and Dr Anilkumar. Also, I extend my thanks to Rtd. Prof S.B. Sajjanshetty and Rtd. Prof. Sangshetty Gadge, Department of Mathematics and Dr Jagannath Hebbale, Head Department of Kannada, Karnatak Art's Science and Commerce College, Bidar.

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೧೯೮೬ ರಲ್ಲಿ ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯದ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆಯಲ್ಲಿ ಎಂ.ಎ. ಕನ್ನಡ ಮತ್ತು ಜಾನಪದ ತರಗತಿಗೆ ಪ್ರವೇಶ ಪಡೆದ ನಂತರ ಡಾ.ಬಿದರಿ ಚಂದ್ರಭಾಗಾ ಅವರ ಪರಿಚಯವಾಯಿತು. ಗುರುಗಳಾಗಿದ್ದ ಡಾ.ಎಂ.ಎಸ್.ಲಕ್ಷ್ಮಿ ಸರ್ ಅವರು ಡಾ.ಬಿದರಿ ಅವರ ಬಗ್ಗೆ ಮಾತನಾಡುತ್ತ ಬಿದರಿ ಪ್ರತಿಭಾವಂತೆ ವಿದ್ಯಾರ್ಥಿನಿಯಾಗಿದ್ದರು. ಕಷ್ಟಪಟ್ಟು ಅಧ್ಯಯನ ಮಾಡುತ್ತಿದ್ದರು. ಹೆಬ್ಬಾಳೆ ನಿಮಗಿಂತಲೂ ನಾಲ್ಕು ವರ್ಷ ಮೊದಲು ಬಿದರಿಯವರು ಎಂ.ಎ. ಕನ್ನಡ ಮತ್ತು ಜಾನಪದ ಎಂ.ಎ. ಪದವಿ ಮುಗಿಸಿಕೊಂಡು ಸೇಡಂನ ನೃಪತುಂಗ ಪದವಿ ಕಾಲೇಜಿನಲ್ಲಿ ಕನ್ನಡ ಉಪನ್ಯಾಸಕಿಯಾಗಿ ಸೇವೆ ಸಲ್ಲಿಸುತ್ತಿದ್ದಾರೆ. ತಾವೆಲ್ಲ ವಿದ್ಯಾರ್ಥಿಗಳು ಬಿದರಿ ಚಂದ್ರಭಾಗಾರಂತೆ ಪ್ರತಿಭಾವಂತ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಬೇಕೆಂದು ತರಗತಿಯಲ್ಲಿ ಬೋಧನೆ ಮಾಡುವಾಗ ಹೇಳಿದ ನೆನಪು ನನಗಿದೆ. ಈ ಮಾತು ಹೇಳಿದ ತಾತ್ಪರ್ಯ ಇಷ್ಟೇ ಡಾ.ಬಿದರಿ ಚಂದ್ರಭಾಗಾ ಮೇಡಂ ಅವರು ವಿದ್ಯಾರ್ಥಿ ದಿಶೆಯಿಂದಲೇ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆಯ ಪ್ರಾಧ್ಯಾಪಕ ವೃಂದದವರ ಮೇಲೆ ತನ್ನ ಛಾಪನ್ನು ಹಾಕಿ ತನ್ನ ವ್ಯಕ್ತಿತ್ವವನ್ನು ರೂಪಿಸಿಕೊಂಡಿದ್ದರು ಎಂಬುದನ್ನು ನಾನು ಹೇಳಬೇಕಾಗಿದೆ.

ಸಹೋದರಿ ಬಿದರಿ ನನಗೆ ೩೦ ವರ್ಷಗಳಿಂದ ಪರಿಚಿತರಾಗಿದ್ದಾರೆ. ಅಂದಿನಿಂದ ಇಂದಿನವರೆಗೆ ಅದೇ ಪ್ರೀತಿ, ಗೌರವ, ವಿಶ್ವಾಸ, ನಮ್ಮಿಬ್ಬರಲ್ಲಿ ಹಸಿರಾಗಿದೆ. ಯಾವುದೇ ಅಡ್ಡಿ ಆತಂಕಗಳು ಬಂದಿರುವುದಿಲ್ಲ, ಒಬ್ಬ ಉತ್ತಮ ಬರಹಗಾರ್ತಿ, ವಾಗ್ಮಿ ಆಗಿದ್ದಲ್ಲದೆ ಅತ್ಯುತ್ತಮ ಕನ್ನಡ ಪ್ರಾಧ್ಯಾಪಕರೂ ಆಗಿದ್ದಾರೆ. ಅವರಲ್ಲಿರುವ ಪ್ರತಿಭೆ ಪಾಂಡಿತ್ಯದಿಂದಾಗಿಯೇ ಇಲ್ಲಿಯವರೆಗೆ ಳ್ಳ ವಿದ್ವತ್ಪೂರ್ಣ ಲೇಖನಗಳು, ೩೦ ಪುಸ್ತಕಗಳು ಪ್ರಕಟಿಸಿದ್ದಾರೆ. ಅನೇಕ ಪುಸ್ತಕಗಳು ವಿವಿಧ ವಿಶ್ವವಿದ್ಯಾಲಯಗಳ ಪದವಿ ತರಗತಿಗಳಿಗೆ ಪಠ್ಯಪುಸ್ತಕಗಳಾಗಿವೆ.

ಅಕ್ಕ ಚಂದ್ರಭಾಗಾ ಅವರದು ಅಪ್ಪಟ ಜನಪದ ಬದುಕು, ಗ್ರಾಮೀಣ ಪರಿಸರದಿಂದ ಬಂದು ಪಟ್ಟಣದ ಬದುಕು ಕಂಡರೂ ಹಳ್ಳಿಯ ಸಂಸ್ಕೃತಿಯಲ್ಲಿಯೇ ತಮ್ಮ ಬದುಕನ್ನು ಮುನ್ನಡೆಸಿದ್ದಾರೆ. ಎಲ್ಲರೊಂದಿಗೆ ನಗು ನಗುತ್ತ ಮಾತನಾಡುತ್ತ ಸುತ್ತ-ಮುತ್ತಲಿನವರಿಗೆ ಬೆಲದ ಪಾಕಾಗಿದ್ದಾರೆ. ಶೀಮಂತಿ ಚಂದ್ರಭಾಗಾ ಅವರು ಒಬ್ಬ ಸೇಹ ಜೀವಿಯಾಗಿ



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Chapter 10

Palmprint Biometric Data Analysis for Gender Classification Using Binarized Statistical Image Feature Set



Shivanand Gornale, Abhijit Patil, and Mallikarjun Hangarge

Abstract Biometrics may be defined as a technological system that metrics individuals based upon their physiological and behavioral traits. The performance of behaviometrics system is destitute, as very few operational systems are deployed. In contrast, physiometrics systems seems significant and are used more due to its individuality and permanence features such as iris, face, fingerprint, and palmprint traits are well used physiometrics modalities. In this paper, authors have implemented algorithm which identifies human gender based on palmprint by using binarized statistical image features. Filters ranging from 3×3 to 13×13 , with a fixed length of 8bit that allows in capturing detail information from ROI palmprints. The proposed method achieved the accuracy of 98.2% on CASIA palmprint database outperforming result is noticed and competitive.

10.1 Introduction

Security concerns, as the credentials-based methods are not prevailing and suitable for usage, thus simply biometrics-based measures are adapted and mapped to rapid growing technologies. The era of biometrics is evolved nowadays usage of biometrics become inevitable for gender classification and user identification (Gornale et al. 2015; Sanchez and Barea 2018; Shivanand et al. 2015). Likewise for many years, the humans have been also interested in palm and palm lines for the telling fortunes. Scientists have also determined the association of palm line by certain genetic disorders (Kumar and Zhang 2006) like Down syndrome, Cohen syndrome, and Aarskog syndrome. Palmprint is an important biometrics trait, which gains lot of

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attention because of its high potential authentication capability (Charif et al. 2017). A few studies have been carried out related to gender identification using palmprints. In this context, palmprint-based gender identification will be among the next most popular task for improvising accuracy of other biometrics devices and may even sometimes double the speed of biometrics system. The problem of comparison will be reduced to half the database by it relatively to other methods. The gender classification has several applications even in civil, commercial domain, surveillance, and especially in forensic science for criminal detection and nabbing the suspects, etc.

Gender identification using palmprint is a binary class problem of deciding whether given palm image corresponds to a male or to a female. Palmprints are permanent (Kumar and Zhang 2006) and unalterable (Krishan et al. 2014) by nature, whereas shape and size of an individual's palm may vary with age, although basic patterns remain unchanged (Kanchan et al. 2013). This makes palmprint slightly noteworthy and individualistic. In earlier studies, it is observed that palmprint patterns are genotypically determined (Makinen and Raisamo 2008; Zhang et al. 2011) and there exists greater differences between female and male palmprints. These are absolute means that can be considered to identify gender of an individual. Palmprint contains both high- and low-resolution features like Geometrical, Delta-point, Principal-Lines, Wrinkles and Minutiae (ridges) features, etc. (Gornale et al. 2018). In proposed method, binarized statistical image feature (BSIF) technique is used. Based on which the performance of this technique is evaluated on CASIA palmprint public database. The results are outperforming performance which is noticed in the literature. The remaining part of the paper consist of following: Sect. 10.2 contains the work related to palmprint-based gender classification, and Sect. 10.3 focused on proposed methodology. In Sect. 10.4, experimental results are discussed, and Sect. 10.5 contains the comparison between the proposed method and existing results, and finally in Sect. 10.6, conclusions are presented.

10.2 Related Work

The research done earlier reveals that it is possible to authenticate an individual from palmprint, but the work carried out in this domain is very scanty. In this section, we discuss review of studies that have been classified on gender identification, G. Amayeh et al. (2008) investigated possibilities of obtaining the information pertaining to gender by using palmprint; for this, they used palmprint geometry and fingers which they encoded making use of Fourier descriptors for evaluation; data is collected from 40 subjects and obtained the result of 98% with limited dataset. After those Wo et al. (2014), classified palmprints geometrical properties using polynomial support vector machine classifier 85% accuracy are attained with a separate 180 palmar images collected from 30 subjects. Unlikely, these datasets are not available publically for further comparison. Gornale et al. (2018) have performed fusing Gabor Wavelet with local binary pattern on publicly CASIA palmprint database using simple nearest neighbor classifier; an accuracy of 96.1% is observed. Xie et al. (2018) have explored with hyper-spectral CASIA palmprint dataset with convolution

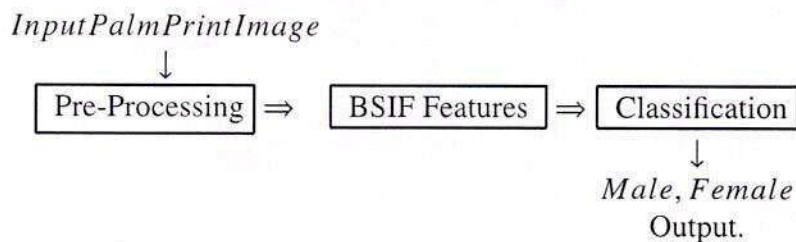


Fig. 10.1 Diagram representing the proposed methodology is given in Fig. 10.1

neural network and fine-tuning of visual geometry group net (VGG-Net) managed to achieve a considerable accuracy of 89.2% with blue spectrum.

10.3 Proposed Methodology

The proposed method comprises the following. As first step, the palmprint image is preprocessed which normalizes an input image and crops the region of interest (ROI) from the image of the palm. In the second step, the features are computed using BSIF. In the last step, the computed features are classified. Figure 10.1 gives a representation of the proposed methodology.

10.3.1 Database

In the proposed work, authors have utilized CASIA palmprint database which is available to the public (CASIA) (<http://biometrics.idealtest.org/>). From the CASIA palmprint database, we have considered a subset of 4207 palmprints, out of which 3078 palm images belongs to male and 1129 belongs to female subjects, respectively. Images from database are shown in Fig. 10.2.

10.3.2 Preprocessing

Preprocessing enhances some important features by restraining undesirable distortions. In this experiment, the pre-processing is performed to extract the region of interest (Zhenan et al. 2005).

The following are the preprocessing steps :

- Step 1 First the input image is smoothened, with the help of Gaussian filter and after that it is binarized (Otsu 1979).
- Step 2 Image is normalized to a size of 640×480 .

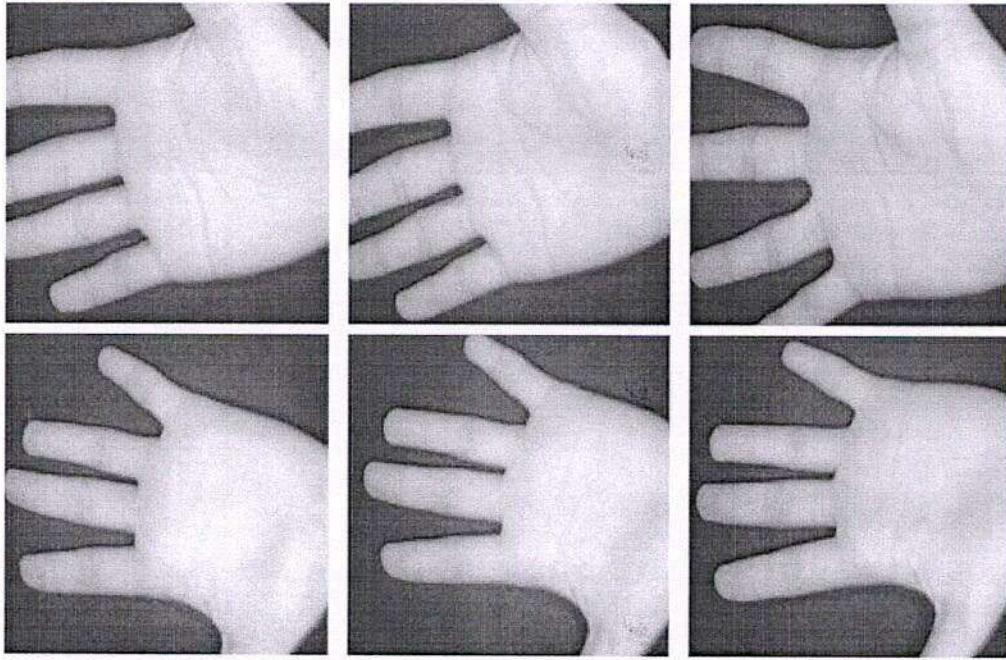


Fig. 10.2 Samples of the database

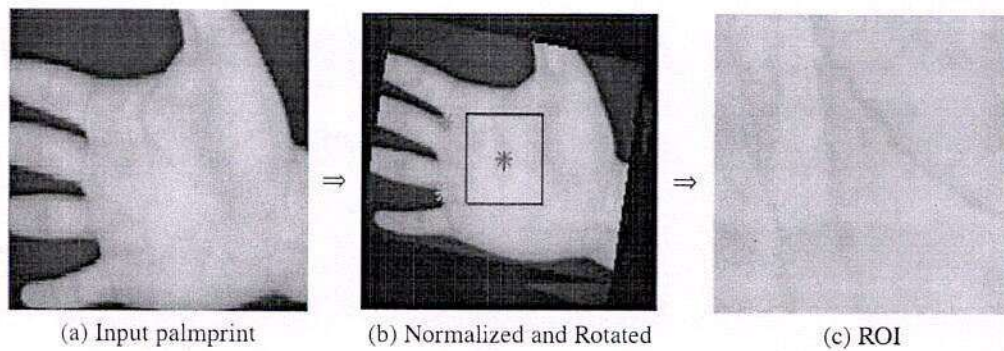


Fig. 10.3 Region of interest (ROI) extraction

- Step 3 Two key points are searched; key-point no. 1 is the gap between forefinger and middle finger. Key-point no. 2 is the gap between the ring finger and little finger (Shivanand et al. 2019).
- Step 4 To determine palmprints co-ordinate system, the tangents of previously located two key points are computed.
- Step 5 The line which joins these two key points is considered y -axis, along with it the centroid is detected, and the line passing through perpendicular to it is treated as x -axis.
- Step 6 After obtaining the co-ordinates by step 5, the sub-image from the co-ordinates is contemplated as region of interest. The process of region of interest extraction can be understood from Fig. 10.3.

10.3.3 Feature Extraction

Feature computation is performed on extracted palmprint images using binarized statistical image features which are identical to local binary patterns and local phase quantization (Gornale et al. 2018; Juho and Rahtu 2012). BSIF technique conventionally encodes textural information from the sub-regions of the image. The BSIF method (Patil et al. 2019) produces basic vectors by projecting the patch linearly onto the sub-spaces by independent component analysis (Abdenour et al. 2014; Juho and Rahtu 2012). Each pixel co-ordinate value is thresholded, and equivalent binary code is generated. The value of local descriptor of the image intensity patterns is represented by value in the neighborhood of the selected pixel. For palmprint $P(b, c)$ and a BSIF filter $W_i^{K \times K}$, the filter response is obtained as follows:

$$r_i = \sum_{b,c} P(b, c) \times W_i^{K \times K}(b, c) \quad (10.1)$$

Where 'x' denotes the convolutional manipulation, b and c indicates the size of the palmprint image patch and $W_i^{K \times K} = (1 \dots L)$ represents filter length and $K \times K$ represents the filter size.

$$d(i) = \begin{cases} 1, & \text{if } r_i > 0 \\ 0, & \text{otherwise} \end{cases} \quad (10.2)$$

Likewise, for each pixel (b, c) represents the corresponding pixel; L represents filter length; and the BSIF features are obtained by plotting the histogram of the obtained binary codes, from each sub-region of ROI.

$$BSIF_i^{K \times K}(b, c) = \sum_{l=1}^i d(b, c) \times (2^{l-1}) \quad (10.3)$$

In this experiment, size is varied from 3×3 to 13×13 , so that we have utilized six different sizes of filters, and size is fixed to standard 8 bit length coding. Consequently, the feature vector of 256 elements from each male and female ROI is extracted from palmprint images. Figure 10.4 represents the visualization of the application of these filters.

10.3.4 Classifier

Linear discriminant analysis (LDA) is the primary classifying techniques that have smaller computational complexity, which is commonly utilized for reducing the dimensionality (Zhang et al. 2012). It works by separating the variance both between

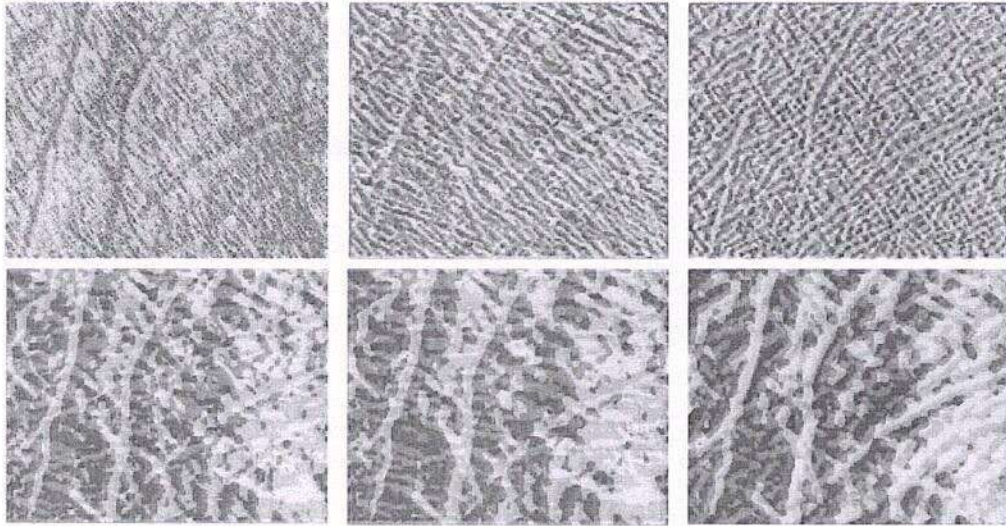


Fig. 10.4 Feature extraction

and within the classes (Jing et al. 2005). LDA is a binary classifier, which classifies class label '0' or '1' from the palmprint images based upon the class variances.

Nearest neighbor classifier classifies the class labels based upon different kinds of distances. It classifies the class values based on k-value and interns which explores for immediate neighbors and provides labeling for unlabeled sample.

$$d_{\text{Euclidean}}(M, N) = \sqrt{(M - N_i)^T(M - N_j)} \quad (10.4)$$

$$d_{\text{Cityblock}}(M, N) = \sum_{j=1}^n (|M_j - N_j|) \quad (10.5)$$

Support vector machines (SVMs) embody a new statistical learning technique which classify the label based upon different kinds of learning functions (Shivanand et al. 2015). It is basically a binary modeled classifier that endeavors to seek an optimal hyper-plane which separates the labels form a set of n data vectors from Y_i labels.

$$FX = (WT.Y_i - b \geq 1) \quad (10.6)$$

Here, Y_i predicts value either of the class belonging to male or female class by using $F(X)$ discriminative function. Geometrically support vector machines are the training patterns that are nearest to the decision boundary.

10.4 Experimental Results and Discussion

In this work, gender classification using palmprint biometrics is explored by employing BSIF filters through varying different filters sizes. The filters size is varied from 3×3 to 13×13 such that we have six different sizes of filters, and length is fixed to standard 8bits length coding. The experimentation is carried out by 10-fold cross validation over different binary classifiers like LDA, K-NN, and SVM classifier on the publicly available CASIA palmprint database. Precision (P), recall(R), F-measure (F), and accuracy (A) is calculated. The results during the exhaustive experiments are demonstrated in Tables 10.1 and 10.2.

From Table 10.1, it is observed that by utilizing 3×3 8bit length filters, K-NN classifier with Euclidean distance for $K = 3$ has obtained the accuracy of 85.5% which is empirically fixed throughout the experiment, and the lowest accuracy of 76.1% has been obtained by LDA. Support vector machine has performed less compared with K-NN and has been noted to be 80.6%, respectively. Similarly, for 5×5 8 bit length filters, it is observed that by using K-NN classifier with Euclidean distance an accuracy of 93% has been obtained, and the lowest accuracy of 76.3% has been obtained by LDA classifier. Support vector machine has performed less compared to K-NN and has noted to be 85.9%, respectively. Further, by using 7×7 8bit length filters, the K-NN classifier has yielded the highest accuracy of 96.7% with Euclidean distance, and the lowest accuracy of 79.7% has been obtained using LDA. Support vector machine has performed less compared to K-NN and has noted to be 91%, respectively.

From Table 10.2, it is observed that by 9×9 8bit length filters, the highest accuracy of 98.1% with K-NN city block distance has been noted, and the lowest accuracy of 80.1% has been obtained with LDA. Support vector machine classifier yields less result compared to K-NN and has noted to be 93.8%, respectively. Similarly with 11×11 8bit length filters, we noticed a higher result of 98.2 % result with K-NN city block distance classifier, and support vector machine classifier follows similar trends with lesser result than the K-NN classifier as of 95.2% accuracy, and the lowest accuracy of 80.8% has been attained by using LDA classifier. From 13×13 8bit length filter, we have noted similar results as 11×11 filters for K-NN classifier, with accuracy of 98.2% with Euclidean distance, and the lowest accuracy of 79.7%

Table 10.1 Results of 3×3 , 5×5 , and 7×7 filters size

Filter size	3×3				5×5				7×7			
	P	R	F	A	P	R	F	A	P	R	F	A
LDA	0.89	0.80	0.42	76.1	0.89	0.80	0.42	76.3	0.90	0.83	0.43	79.7
SVM Quad	0.90	0.82	0.43	79.5	0.92	0.88	0.45	85.9	0.94	0.88	0.45	86.8
SVM Cubic	0.89	0.85	0.43	80.6	0.92	0.85	0.44	82.8	0.95	0.92	0.46	91
KNN CityBlock	0.92	0.87	0.45	85.2	0.95	0.94	0.47	93.0	0.98	0.97	0.48	96.7
KNN Euclidean	0.92	0.87	0.45	85.4	0.95	0.93	0.47	92.3	0.98	0.97	0.48	97.0

Table 10.2 Results of 9×9 , 11×11 , and 13×13 filters size

Filter size	9×9				11×11				13×13			
	P	R	F	A	P	R	F	A	P	R	F	A
LDA	0.90	0.83	0.43	80.1	0.90	0.84	0.43	80.8	0.90	0.83	0.43	79.7
SVM Quad	0.96	0.90	0.46	89.5	0.96	0.91	0.46	90.9	0.97	0.91	0.47	91.6
SVM Cubic	0.97	0.94	0.47	93.8	0.97	0.95	0.48	95.2	0.98	0.96	0.48	95.9
KNN CityBlock	0.99	0.98	0.49	98.0	0.99	0.98	0.49	98.2	0.98	0.98	0.49	98.1
KNN Euclidean	0.99	0.98	0.49	97.9	0.99	0.98	0.49	98.1	0.98	0.98	0.49	98.2

Table 10.3 Detail confusion matrix of all filters size

	3×3		5×5		7×7		9×9		11×11		13×13	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
LDA	2753	325	2756	322	2792	286	2791	287	2784	294	2786	292
	682	447	673	456	567	562	550	579	515	614	561	568
SVM Quad	2790	288	2850	228	2909	169	2963	115	2983	95	2987	91
	576	553	366	763	387	742	326	803	288	841	263	866
SVM Cubic	2745	333	2857	221	2935	143	2994	84	3014	64	3025	53
	482	647	501	628	235	894	175	954	137	992	118	1011
KNN City	2856	222	2945	133	3022	56	3049	29	3055	23	3047	31
	402	727	183	946	82	1047	57	1072	53	1076	48	1081
KNN Eucli	2760	318	2826	252	2964	114	3017	61	3040	38	3039	39
	369	760	220	909	107	1022	64	1065	53	1076	40	1089

has been obtained by LDA. Support vector machine has performed less in comparison to K-NN and has yielded 95.9% accuracy.

The confusion matrix for the following experiment is illustrated in Table 10.3. By varying the size and length with a fixed length of 8bit, it has been observed that as the filter size is increased, higher accuracy is attained. Thus, varying the size of filters allows in capturing various information from ROI palmprints images.

10.5 Comparative Analysis

To realize effectiveness of the proposed method, the authors have compared it with similar works present in literature predicted in Table-10.4. In Amayeh et al. (2008), the authors have made use of palm geometry, Zernike moments, and Fourier descriptors and obtained 98% accuracy on relatively smaller dataset of just 40 images.

Table 10.4 Comparative analysis

Authors	Features	Database	Classifier	Results (%)
Amayeh et al. (2008)	Palm geometry fourier descriptor and Zernike moments	20 males and 20 females	Score level fusion with linear discriminant analysis	98
Wo et al. (2014)	Palm geometry feature	90 male and 90 females	Polynomial support vector machine	85
Gornale et al. (2018)	Fusion of gabor wavelet & Local binary patterns	CASIA database	K-nearest neighbor	96.1
Xie et al. (2018)	Convolution neural network	Multi-spectral CASIA database	Fine-tuning visual geometry group net	89.2
Proposed method	Binary statistical image features	CASIA database	K-nearest neighbor	98.2

However, Wo et al. (2014) have utilized very basic geometric properties like length, height, and aspect ratio with PSSVM and obtained 85% accuracy. Gornale et al. (2018) have performed fusing Gabor Wavelet with local binary pattern on publicly CASIA palmprint database. Xie et al. (2018) have explored gender classification with hyper-spectral CASIA palmprint dataset with convolution neural network and fine-tuning of visual geometry group net (VGG-Net). The drawback of the reported works with self-created database is that they are inapt with low-resolucional and far-distant images captured through non-contact method, as they require touch-based palm acquisition. However, the proposed method is worked with public database which is suitable for both the approaches. The proposed method outperformed by using BSIF filters with basic K-NN classifier on relatively larger dataset consisting of 4207 ROIs of palmprints, which yielded the progressive result of an accuracy 98.2%. A brief summary of comparison is presented in Table 10.4.

10.6 Conclusion

In this paper, authors explore the performance of binary statistical image features, i.e., BSIF on CASIA palmprint images, by varying the filter size with a fixed length of 8bit length, further the filter size is increased, and progressive result of 98.2% is noticed for filter size of 11×11 and above. Thus, varying the size of filters allows capturing information from ROI palmprints. The proposed method is implemented on contact-free-based palmprint acquisition process, and this is implacable to both contact and contact-less-based methods. Our basic objective in this work is to develop a standardized system that can efficiently distinguish between males and females on

the bases of palmprints. Likewise, with basic K-NN classifier and BSIF features, authors have managed to enact relatively better result on larger database of 4207 palmprint images. In near future, plan is device generic algorithm which identifies gender based on multimodal biometrics.

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Old Handwritten Music Symbol Recognition Using Radon and Discrete Wavelet Transform



Savitri Apparao Nawade, Rajmohan Pardeshi, Shivanand Rumma, and Mallikarjun Hangarge

Abstract Optical music symbol recognition deals with the conversion of scanned musical symbols into digital readable form. Though existing techniques have achieved considerable result for printed musical symbols, for handwritten musical symbol, there is a lot of room for research as it comes with several challenges such as degradation, skew, and non-uniformity of symbols. In this paper, we have presented discrete wavelet transform and radon transform to extract directional multi-resolution features from the input musical symbols. Further, k-NN classifier is used to classify the music symbols and achieved an encouraging accuracy of classification as 95.04% with ten-fold cross-validation.

Keywords Cross-validation · Discrete wavelet transform · Radon transform · Nearest neighbor classifier

1 Introduction

Optical music symbol recognition aims at automatic reading of music symbols by means of computer. It is easy to recognize the printed music symbols by a computer, whereas recognition of old handwritten music symbols is a difficult task due to variations in writing styles, instrument used to write the symbols, height, and width of the symbols, thickness of the symbols, mode of the writer, degradation due

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to aging of the paper, etc. All these challenges make the old handwritten music symbols recognition problem more difficult compared to simple handwriting or printed symbol recognition. This paper presents a multi-resolution feature-based old handwritten music symbols recognition system.

The remaining part of the paper is as follows. Section 2 deals with related research work; in Sect. 3, research methodology is presented, Sect. 4 contains experimental findings and discussion, and in Sect. 5, conclusion is drawn.

2 Related Work

During the last two decades, music symbol recognition has received huge attention. In this section, we have summarized the related work reported for music symbol recognition. Fornes et al. [1] introduced a system which recognizes the old handwritten music symbols which belong to 17–19 century, on applying dynamic time warping method, and compared the performance of Zernike moments with DTW and observed that Zernike moments are giving very poor results. Baro-Mas [2] presented a method which recognizes both online and offline handwritten music symbols. They have used CVC-MUSICMA dataset for experimentation which consists of single and composite music symbols. To recognize single music symbols, Blurred Shape Model (BSM) and Zoning feature extraction methods were used and applied a k-NN classifier. They have observed that Zoning of music symbols was useful for recognition of printed music sheet. They removed long ties and braces in the composite music symbols on applying staff line estimation, calculated the aspect ratio of aligned long joined components, and then, they segmented symbols by considering vertical projection of the symbol. Oh et al. [3] worked on the recognition of online handwritten music symbols by considering HOMUS database which consists of strokes and music symbols. Applied stroke classification to classify the strokes based on three features viz histograms of directed, undirected movement angles and the music symbol size. Calvo-Zaragoza et al. [4] introduced a system to recognize the music symbols both online and offline. In offline method, they have tested on their own dataset of 3800 music symbols written by 32 music composers, and for online, they have used e-pen and tablet for digitizing the music symbols. And after comparing both online and offline methods, they observed that offline method achieves higher accuracy. However, the authors have not reported the reason for getting high recognition accuracy for offline symbols compared to online music symbols. Pugin et al. [5] compared both printed and handwritten music symbol recognition by considering GAMERA and ARUSPIX and also compared the performance of all classifiers such as SVM, k-NN, and HMM and observed higher accuracy for printed music symbols. Due to the variations in scale, thickness, shape of handwritten symbols yielded lower results. Chanda et al. [6] worked on offline handwritten music symbols. They have used structure shape descriptors and texture analysis-based features. They have compared the performance of modified quadratic discriminant function (MQDF) and support vector machine (SVM) and obtained the highest accuracy for

MQDF classifier. Nawade et al. [7] worked on projection profiles to recognize the old handwritten music symbols and achieved an accuracy of 95.72%. Nawade et al. [8] reported directional multi-resolution spatial features which recognize the old handwritten music symbols and obtained 98.16% accuracy. Miyo and Maryuyum [9] introduced an online handwritten music scores recognition system. They considered directional strokes and series of data as features of the image, and on applying SVM classifier, they achieved a higher accuracy of 97.60%. Raphael et al. [11] introduced a top model and template matching methods to recognize the isolated music symbols.

3 Proposed Methodology

In this paper, proposed a three steps recognition system of handwritten music symbols. The three steps are preprocessing, feature extraction, and classification of the symbols. Feature extraction is carried out based on combining discrete wavelet transform and radon transform features. Old handwritten music symbols are then classified using k-NN classifier. The proposed method flowchart is given in Fig. 1.

Preprocessing: In preprocessing, usually input image is binarized with Otsu method, and normalization of the image is done; after that, some morphological operations are applied on the image. But in our case, already input images are binarized and isolated ones. Therefore, we have not implemented any preprocessing algorithm here.

Feature Extraction: Feature extraction is very significant step, to compute the meaningful information from raw music symbols, we have used a frequency-based radon transform technique, to compute directional energies, these are nothing but projections (sum of the lines) along any arbitrary line on the xy plane or two dimensional spaces. It is normally represented as $g(\rho, \theta)$ and is used to reconstruct the image. When this is applied to any input image, in our case the music symbol, then it

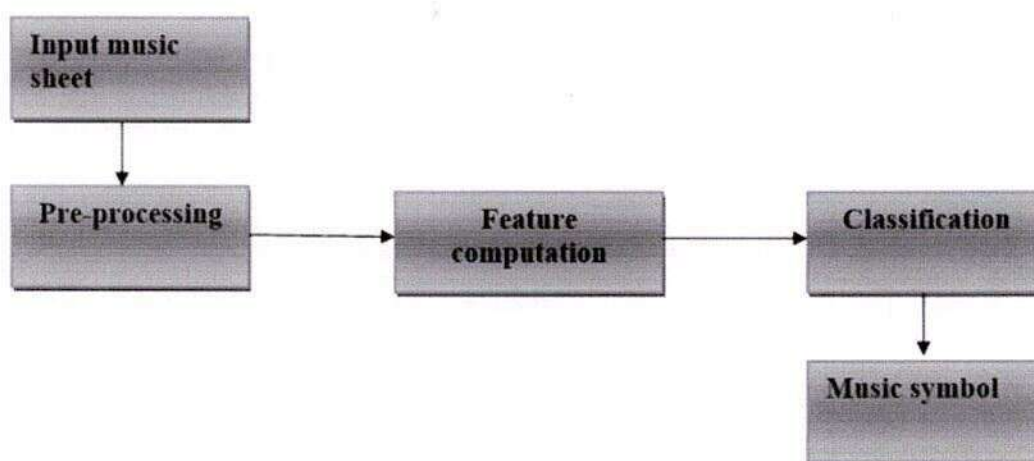


Fig. 1 Proposed method flowchart

will reconstruct the image by collecting all the back projections (lines) of the image. Normally, mathematical expression for any straight line is represented as

$$a \cos\theta + b \sin\theta = \rho \quad (1)$$

where a and b represent x and y -axis. Here, we have to collect all the lines and integrate them, by changing ρ value and keeping θ constant, this can be mathematically represented as

$$g(\rho_j, \theta_k) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(a, b) \delta(a \cos\theta_k + b \sin\theta_k - \rho_j) \quad (2)$$

Then, θ value has to be changed and should be put in the same line, after computing all the projections, a final Radon transform equation can be represented as

$$g(\rho_j, \theta_k) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(a, b) \delta(a \cos\theta + b \sin\theta - \rho) \quad (3)$$

After computing the directional energies by applying radon transform, these radon coefficients are fed to discrete wavelet transform and further decomposed in three sub-bands which encode the input information in three directions such as vertical, horizontal, and diagonal. Another one is approximation. By performing multi-resolution analysis, we obtained coefficients, and these coefficients are called as RWT coefficients [12]. In this method, DWT *Daubechies₉* is used for multi-resolution analysis. We have applied four-level decomposition to radon energy coefficients which gives four DWT sub-bands at each level. In this way, we got totally $4 * 4 = 16$ RWT sub-bands.

Fixed-size feature vector is computed by calculating entropy (E) and standard deviations (S) from each RWT sub-bands. In this work, we have used totally 32 features = 16 sub-bands * 2 statistical measures. Entropy and standard deviations are presented as below:

$$E = - \sum p(r_i) \log_2 p(r_i), S = \sqrt{\frac{1}{N-1} \sum (K_{mn} - \bar{K})^2}$$

Where r_i is the variable of discrete radon and denotes the RWT coefficients, and $P(r_i)$ is its probability of co-occurrence, and RWT coefficients and their mean are denoted by K_{mn} and \bar{K} , respectively. More details on combination of radon and wavelet transform-based directional multi-resolution features are given in [10, 12]

Nearest Neighbor Classifier: To do the classification of old handwritten music symbols, here we are using a simple NN classifier. Let us assume that $B(b_1 \dots b_m)$ is used as training pattern vector, and $D(d_1 \dots d_m)$ is used as testing pattern vector. The basic process for classification is summarized in following steps:

- Calculate the city block distance between the test pattern and each of its neighbors.
- Assign the test pattern to the class of its nearest neighbor.

City block distance between two patterns is given by:

$$d_{\text{cityblock}} = \sum_{i=1}^M |b_i - d_i| \quad (4)$$

4 Results and Discussion

Our proposed method was focused to recognize isolated old handwritten music symbols, and dataset consist of a total of 4098 music symbols in which 2128 are clefs and 1970 are accidentals symbols such as accidentals of four types: Accidental Doub sharp, Accidental Flat, Accidental Natural, and Accidental sharp and three clef types: Clef Alto, Clef Bass, and Clef Treble. Samples from the dataset are shown in Fig. 2. We have applied k-NN classifier with the $k = 3$ on the dataset. The city block distance measure is used by the K-NN classifier to classify the symbols based on the directional multi-resolution features. The performance of proposed methodology is evaluated with ten-fold cross-validation. In Table 1, recognition accuracy of different music symbols is given. From the table, we can observe that Accidental Doub sharp has achieved the higher accuracy 99.59%, whereas Accidental sharp achieved the lower one 83.81%. For better understanding, we have given the confusion matrix in Table 2. We have compared our approach with existing method in Table 3. Our method outperforms over the existing method presented in [1].

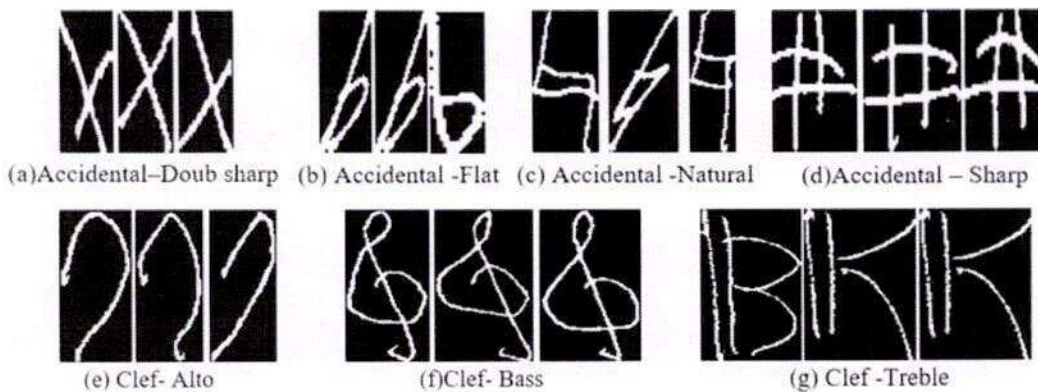


Fig. 2 Samples of old handwritten music symbols

Table 1 Recognition accuracy of music symbols of seven classes

Class	Music symbol	Recognition accuracy (%)
1	Doub Sharp_Accidental	99.59
2	Flat_Accidental	94.01
3	Natural_Accidental	93.43
4	Sharp_Accidental	83.81
5	Alto_Clef	93.95
6	Bas_Clef	98.00
7	Treble_Clef	98.53

Table 2 Confusion matrix

Class no.	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
1	496	0	0	0	0	1	0
2	4	487	20	6	0	0	0
3	1	15	441	14	0	0	0
4	1	28	45	404	3	0	0
5	0	0	3	9	715	17	15
6	0	1	0	0	7	540	1
7	0	0	0	0	10	2	808

Table 3 Comparison with similar work

Method	Dynamic time warping	Our method
Accuracy (%)	89.55	95.04

5 Conclusion

In this study, we have employed combined radon and discrete wavelet transform on isolated old handwritten music symbols to get directional multi-resolution information of the music symbol which is used to classify the music symbols using k-NN and achieved an accuracy of 95.04%. In future, we will concentrate on recognition of combined musical symbols with different approaches. We also aim to classify the handwritten and printed music symbol sheets.

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ಸೌಹಾರ್ದ ವೃಕ್ಷ

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SOUHARDA PATHA

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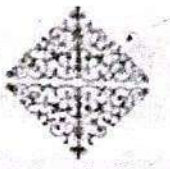
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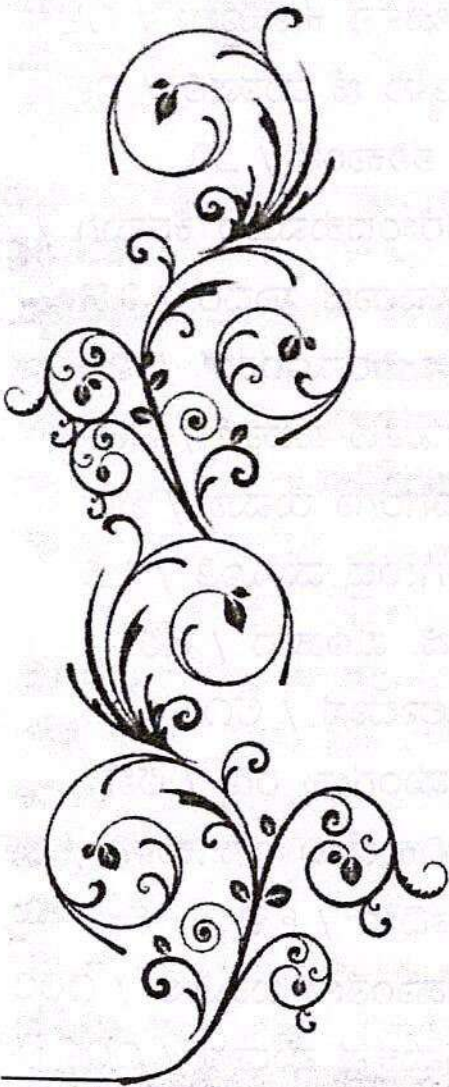
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೯.

ಜಾತ್ರೆಗಳಲ್ಲಿ ಸಾಮರಸ್ಯದ ನೆಲೆಗಳು

❖ ಡಾ. ಜಗನ್ನಾಥ ಹೆಬ್ಬಾಳೆ



ಮುಖ್ಯಸ್ಥರು ಹಾಗೂ
ನಿರ್ದೇಶಕರು, ಕರ್ನಾಟಕ
ಕಾಲೇಜು ಸ್ನಾತಕೋತ್ತರ ಕನ್ನಡ
ಅಧ್ಯಯನ ಹಾಗೂ ಸಂಶೋಧನ
ಕೇಂದ್ರ, ಬೀದರ-೫೮೫೪೦೧
ಮೊ. ೯೪೪೮೫೮೫೨೪೪

ಜಾತ್ರೆ ಎಂಬ ಪದಕ್ಕೆ 'ಪುಣ್ಯಕ್ಷೇತ್ರ' ದರ್ಶನ ಧಾರ್ಮಿಕ ಉದ್ದೇಶದಿಂದ ಮಾಡುವ ಪಯಣ, ಯಾತ್ರೆ ಎನ್ನುವ ಅರ್ಥದ ಜೊತೆಗೆ ಯಾವುದಾದರೊಂದು ದೇವತೆಯ ರಥೋತ್ಸವ ಇಂಥ ಸಂದರ್ಭದಲ್ಲಿ ಸೇರುವ ಜನರ ಗುಂಪು, ಪರೀಕ್ಷೆ ಎಂಬ ಅರ್ಥವಿದೆ. (ವೆಂಕಟಸುಬ್ಬಯ್ಯ: ೧೯೭೭:೩೦೩೭). ಆಂಗ್ಲದ ಫೇರ್ ಶಬ್ದದ ಅರ್ಥವೇ ಕನ್ನಡ ಜಾತ್ರೆ, ಫೇರ್ (Fair) ಎಂದರೆ ಹಬ್ಬದೂಟದ ದಿನ. ರಜಾದಿನ ಹೀಗೆ ಹಬ್ಬದೂಟ ಮತ್ತು ಜಾತ್ರೆಗೆ ಸಂಬಂಧ ಕಲ್ಪಿಸಲಾಗಿದೆ. ಜನ ಸೇರಿದರೆ ಜಾತ್ರೆ ಎನ್ನುತ್ತಾರೆ. ಜನ ಸೇರುವುದೆಲ್ಲ ಜಾತ್ರೆ ಆಗಲಾರದು. ಅದು ಒಂದು ಸಂತೆಯಾಗಬಹುದು. ಡಾ. ಎಂ. ಎಸ್. ಲಕ್ಷ್ಮಯ್ಯವರು 'ಯಾನೇನ ಶ್ರಾಯತ್ ಇತಿ ಯಾತ್ರಾ' ಎಂದಿದ್ದಾರೆ. ಅಂದರೆ ಪುಣ್ಯ ಕ್ಷೇತ್ರ ದರ್ಶನಕ್ಕೆ ಹೋಗುವವರ ರಕ್ಷೆಯೇ ಯಾತ್ರೆಯಾಗಿದೆ. ಈ ಯಾತ್ರೆ ಶಬ್ದದ ತದ್ಭವ ರೂಪವೇ ಜಾತ್ರೆ.

ಪ್ರತಿವರ್ಷ ಸಾಧಾರಣವಾಗಿ ಸುಗ್ಗಿಯ ನಂತರ ದೇವರುಗಳ ಗೌರವಾರ್ಥ ಜಾತ್ರೆ ನಡೆಸುವ ವಾಡಿಕೆಯಿತ್ತು. ಹಳ್ಳಿ ಪಟ್ಟಣಗಳ ದೇವಾಲಯ, ದರ್ಗಾ ಮತ್ತು ಚರ್ಚ್ ಮುಂತಾದ ಪವಿತ್ರ ಪೂಜಾಸ್ಥಳಗಳಲ್ಲಿ ಜನರು ಜಾತ್ರೆಗಳನ್ನು ನಡೆಸುತ್ತಾರೆ. ದೇವರ ಮೂರ್ತಿಯನ್ನು ರಥದಲ್ಲಿ ಇಲ್ಲವೆ ಜೀಪು ಲಾರಿಗಳಲ್ಲಿಟ್ಟು ವಾದ್ಯಗಳ ಸಹಿತ ಮೆರವಣಿಗೆಯಲ್ಲಿ ಹೋಗುವರು. ಅದೇ ಸಮಯದಲ್ಲಿ ಬಾಳೆಹಣ್ಣು, ಅಕ್ಕಿ, ಖಾರಿಕು ಮುಂತಾದವುಗಳು ತೇರು ಇಲ್ಲವೆ ವಾಹನಗಳ ಮೇಲೆ ಎಸೆಯುತ್ತಾ ಮುನ್ನಡೆಯುವರು. ಜಾತ್ರೆಯ ಹೆಸರಿನಲ್ಲಿ ಸ್ಥಳ ಮತ್ತು ದೇವರ ಹೆಸರು ಸೇರಿರುತ್ತದೆ. ಉದಾ: ಬೀದರ ನಗರದಿಂದ ಎರಡು ಕಿ.ಮೀ. ದೂರದಲ್ಲಿರುವ 'ಪಾಪನಾಶಿನಿ' ದೇವಾಲಯದಲ್ಲಿ ಸ್ವಯಂಭು

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ASSESSMENT OF PLANT PIGMENTS AS NATURAL DYES FOR TEXTILE INDUSTRIES

Dr Vijaykumar Biradar , Pooja Shrigiri

Karnatak Arts Science and Commerce College, Bidar, (Karnataka, India)

ABSTRACT

Worldwide the interest in the production of pigments from natural sources increased due to a serious safety problems with many artificial synthetic dyes, which have widely been used in foodstuff, cosmetic and pharmaceutical manufacturing processes. Therefore, the people are motivating towards authorized natural food colorants obtained either from plant or animal origin. During the last decade the use of natural dyes, obtained from animal or vegetable matter without any chemical processing has gained momentum due to increased demand for these dyes by the food, pharmaceutical, cosmetic as well as the textile coloration industry. Hence the present study was carried out in this concern.

In the present study five local plant species are selected to study the bio-colours extracted by them. The selected five plant species have shown potential to produce dark Bio-colors. Therefore they can be used in textile industry using mordant. These pigments can be used as natural dye resource in all walks of life since they are eco-friendly & can be used in place of synthetic dyes. The dyeing ability of these pigments are equally well with synthetic pigments. Further they stain well with cotton than polyester fabrics. Out of 5 plant species, Henna also has shown antimicrobial activity, hence can be used in medicine. The selected plant pigments have shown less decolorisation with sunlight & heat hence they can be used in textiles.

Keywords: Beetroot, Curry leaves, Henna, Flame of the forest, Teak leaves, Bio-colours, Pigments, Dyes, Antibacterial activity, Zone of inhibition.

1. INTRODUCTION

Nature has gifted us more than 500 dye-yielding plant species (Neha et al., 2011). These dyes or colorants derived from plants, animals, and micro-organisms. The majority of natural dyes are vegetable dyes from plant sources like roots, berries, bark, leaves, and woodland other organic sources such as fungi and lichens. Natural colors extracted from fruits, vegetables, seed roots and microorganisms and often called "bio-colors" because of their biological origin (Pattnaik et al., 1997). There is worldwide interest in process development for the production of pigments from natural sources due to a serious safety problem with many artificial synthetic colourants, which have widely been used in foodstuff, cosmetic and pharmaceutical manufacturing processes . It is well known that a variety of plants, animals and micro-organisms produce pigments (Johns & Stuart 1991.).



(ಡಾ. ಜಗನ್ನಾಥ ಹೆಚ್ಚಾಳಿ ಮತ್ತು ಡಾ. ನೀಲಗಂಗಾ ಹೆಚ್ಚಾಳಿ ಅವರ ವಾಂಛಿತ
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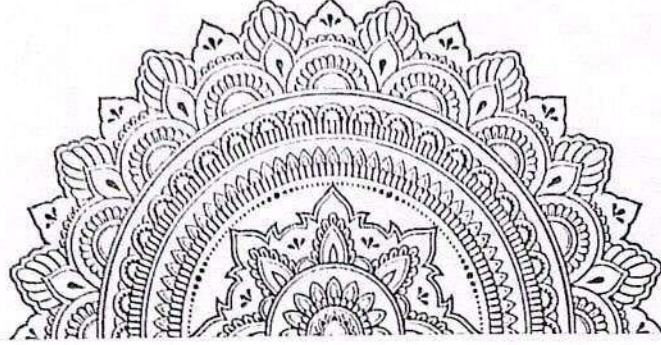


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(ಡಾ. ಜಗನ್ನಾಥ ಹೆಬ್ಬಾಳೆ ಮತ್ತು ಡಾ. ನೀಲಗಂಗಾ ಹೆಬ್ಬಾಳೆ ಅವರ ದಾಂಪತ್ಯ ಜೀವನದ ರಜತ ಮಹೋತ್ಸವದ ಸ್ಮರಣ ಸಂಪುಟ)

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ಡಾ. ಸುನಿತಾ ಕೂಡಿಕರ್

೨೦೨೨

ಪ್ರಕಾಶಕರು
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COLLECTION OF SPIDER SPECIES IN AGROECOSYSTEM

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ABSTRACT

Spiders are one of the most familiar, fascinating, diverse and effective predators in terrestrial ecosystems. They belong to Phylum Arthropoda, Class- Arachnida and Order- Araneae. The order Araneae ranks 7th in total species diversity among all other groups of organisms. Currently 40998 species belonging to 3747 genera and 109 families have been described. India has 1685 spider species from 438 genera and 60 families. All spiders have eight legs and six to eight eyes. Spiders have two body regions: the cephalothorax and the abdomen. Male spiders are normally smaller and have different color markings than females. Spiders range in body length from 0.5 to about 90 mm (0.02-3.5 inches). You can see spiders by day and especially by night in just about any habitat. The forests, Agro ecosystem woodlands and heathlands of our national parks are good places for spider population. All spiders are predators, feeding almost entirely on other arthropods, especially insects. Some spiders are active hunters that chase and overpower their prey. These typically have a well-developed sense of touch or sight. Other spiders instead weave silk snares, or webs, to capture prey. Webs are instinctively constructed and effectively trap flying insects. Many spiders inject venom into their prey to kill it quickly, whereas others first use silk wrappings to immobilize their victims.

Key Words: Agroecosystem Spiders, agro-ecosystem pests, Spiders role in Agroecosystem, etc.

INTRODUCTION:

CLASSIFICATION:

Kingdom : Animalia
Phylum : Arthropoda
Subphylum: Chelicerata
Class: Arachnida
Order : Araneae
Species : Spider.

Agroecosystem are defined as communities of plants and animals interacting with their physical and chemical environments that have been modified by people to produce food, fibre, fuel and other products for human consumption and processing.

Role of spiders in an Agroecosystem and horticulture. Spiders are mark as the "farmers' best friend" especially for the small scale farmer. They are predators and their main preys are insects, many of which eat our crops and pester our livestock. Their populations can be huge:

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वृद्ध-विमर्श

गीता पोस्ते

सहायक प्राध्यापिका ,
हिन्दी विभाग ,
कर्नाटक कला ,विज्ञान एवं
वाणिज्य महाविद्यालय ,बीदर

“बुजुर्गों का आशीर्वाद जाया कहाँ होता है ,
ठंडक वहाँ भी होती है ,
सूखे पड़े का साया जहाँ होता है छ”

काल की गति श्रीप्र हैं, वह इतनी शीघ्रता से चला जाता है कि उस पर किसी की दृष्टि नहीं जाती, एक नवजात शिशु कब अपनी शैशवावस्था छोड़कर युवावस्था में पहुंचा और कब वृद्धावस्था यह पता ही नहीं चलता छ मानव विकास मनोविज्ञान के अनुसार दृ ० दृ ३ वर्ष की आयु शैशवकाल हैं, ४ दृ १२ वर्ष की आयु बाल्यकाल, १३ दृ २० वर्ष का आयु युवावस्था, २० दृ ४० वर्ष की आयु जवान युवावस्था, ४० दृ ६५ वर्ष की आयु माध्यमिक युवावस्था तथा ६५ वर्ष से वृद्धावस्था है छ वृद्धावस्था से कोई बच नहीं सकता, यह जीवन का सत्य है , लेकिन मानुष वृद्धावस्था की कल्पना मात्र से डर जाता है छ निराश हो जाता है और सब चीजों से कटा हुआ महसूस करता है छ वस्तुतः वार्धक्य कोई अभिशाप नहीं, बल्कि वह जीवन की चरम स्थिति है छ अर्थात् जीवन के विकास की चरमावस्था है वृद्धावस्था छ वृद्धावस्था जीवन का सत्य है इसमें कोई भी नहीं बच सकता छ

भारतीय परंपरा में वृद्धों का मान सम्मान किया जा रहा है छ कहा जाता रहा है दृ “आभिवादनशीलस्य नित्यं वृद्धोंपसेविन चत्वारि तस्य वर्धन्ते आयुर्विधा यशो बलम” दृ अर्थात् प्रति दिन बुजुर्गों को प्रणाम करने और उनकी सेवा करनेवाले व्यक्ति की आयु, विद्या, शक्ति और यश में वृद्धि होती है छ लेकिन आज मूल्य बदल रहे हैं व्यक्ति जैसे वृद्धावस्था की ओर बढ़ता है वैसे दृ वैसे अकेलापन, भय और असुरक्षा की भावना उसे घेर लेते हैं छ आज वृद्धों को बोझ समझा जाता है छ समाज में उचित सम्मान ना मिलने के कारण वृद्ध व्यक्तियों का जीवन निराशा की तरफ बढ़ता जाता है छ आज वृद्धों की संपत्ति तो नई पीढ़ी को महत्वपूर्ण लगती है लेकिन उनका ज्ञान और अनुभव बकवास लगता है छ वर्तमान में बुजुर्गों की स्थिति के संदर्भ में लेखिका क्षमा

लिखती है – “अपनों के द्वारा ठुकराए जाने का जो मलाल होता है उसका क्या कोई इलाज है ? उस अकेलेपन और अपमान का अहसास दिलाते हैं कि उनकी जरूरत अब घर में तो क्या इस धरती पर ही नहीं रही छ उन्होंने जिनके लिए अपनी उम्र और अपने सारे संसाधन लगा दिए, वे दो जून की रोटी के लिए दुत्कारते हैं छ” (१) यही आज के समाज का यथार्थ है छ दुनिया की आबादी में एक बड़ी संख्या बुजुर्ग लोगों की है छ इन लोगों की आखिरी पड़ाव में अच्छी देखभाल मिले, एवं बुजुर्गों को वित्तीय रूप से आत्मनिर्भर बनाए जाए ताकि अपनी देखभाल का इंतजाम कर सके छ इसलिए सभी को प्रयास करने चाहिए छ

आज वृद्ध वर्ग निम्न समस्याओं से जूझ रहे हैं दृ

1. शारीरिक दुर्बलता :-

आयु बढ़ने के साथ व्यक्ति का शरीर शिथिल होने लगता है छ आंखों से दिखना कम हो जाता है छ कान से कम सुनाई देता है छ दांत कमजोर हो जाते हैं छ शरीर में अनेक बीमारियां जैसे दूरक्तचाप में व्यक्ति क्रम ,हृदय रोग ,डायबिटीज ,जीर्ण रोग ,जोडो का दर्द ,गठिया आदि से व्यक्ति की कर्मशक्ति घट जाती है

2. मानसिक रोग :-

शारीरिक दुर्बलता के साथ वृद्ध व्यक्ति मानसिक रूप से भी अपने को बहुत असहाय महसूस करता है छ इसके अलावा उसकी स्मरण शक्ति कमजोर पड़ने लगती है छ इस कारण सामाजिक उपयोगिता कम होने के साथ व्यक्ति को अनेक मानसिक चिंताएं घेर लेती है छ

3. अकेलेपन की समस्या :-

वर्तमान युग में परिवार के युवा सदस्य विवाह के बाद अपने माता दृपिता के साथ रहना नहीं चाहते हैं छ फलस्वरूप जिस समय अपने बच्चों की अधिक आवश्यकता और संरक्षण की आवश्यकता होती है ,उस उम्र में अपने दृआपको अकेला और निराश्रित महसूस करते हैं छ

4 . आर्थिक असुरक्षा की स्थिति :-

उम्र वह व्यक्ति अपने परिवार की खुशी और उनके जिम्मेदारियों के वजह से अपना सर्वस्व अर्पण करता है उसे कदम दृकदम पर आर्थिक सामना करना पड़ता है द्य

5. संयुक्त परिवार के अभाव :-

बुजुर्ग लोगों को प्रायः इस समय संयुक्त परिवार की आवश्यकता होती है क्यों कि उनके बीच अपने को सुखद और संतुष्ट जीवन जीने के लिए, लेकिन संयुक्त परिवार में वृद्धावस्था को तुच्छ नजरियों से देखा जाने के कारण वह संयुक्त परिवार में रहकर भी अपने दृआप को अकेला समझता है द्य

6. मनोरंजन की समस्या :-

परम्परागत परिवार में विभिन्न उत्सवों और समारोहों के आयोजन से वृद्धों को अपने परिवार के अलग दृअलग लोगों से मिलने का अवसर प्राप्त होता था लेकिन आज समारोह में टेलीविजन या फोन के द्वारा व्यक्ति अपने मन को बहलाने लगा है द्य बच्चे भी फोन में व्यस्त होने के कारण बुजुर्गों से बात करना तो दूर की बात है वो उसकी तरफ ध्यान भी देना रख आवश्यक नहीं समझता है द्य इस कारण वृद्धों को अकेलेपन का सामना करना पड़ रहा है द्य ऐसे अनेक समस्याओं का सामना वृद्धों को करना पड़ रहा है द्य इसे लेकर अनेक साहित्यकारों ने अनेक उपन्यास और कहानियाँ लिखी है द्य उसमें 'भीष्म साहनी' की 'चीफ की दावत' एक ऐसी कहानी है जिसने हिन्दी में वृद्ध दृविमर्श को एक निर्णायक मोड़ दिया द्य

'भीष्म साहनी' की कालजयी कहानी 'चीफ की दावत' हिन्दी कथा साहित्य में सभी वृद्ध विमर्श के आयामों को अपने भीतर समेटती है द्य इस कहानी में वृद्ध दृविमर्श का उत्कर्ष दिखाई पड़ता है द्य माँ के प्रति मिस्टर शामनाथ का वस्तुवादी दृष्टिकोण है ,वह आज के समाज की घृणित सच्चाई बयां करता है द्य बूढ़ी माँ अपने बेटे शामनाथ के लिए एक समस्या बन चुकी है क्योंकि उसके दपतर के चीफ आज उसके घर भोजन के लिए आ रहे है द्य माँ के कारण इज्जत मिट्टी में मिल सकती थीद्व वे इस समस्या का निदानहिन्द करते हुए कहते है - "और माँ ,हम लोग पहले बैठक में बैठेंगे द्य उतनी देर तुम यहाँ बरामदे में बैठना द्य फिर जब हम यहाँ आ जायें तो तुम गुसलखाने के रास्ते से बैठक में चली जाना द्य"(२)

उपरोक्त पंक्तियों से स्पष्ट है कि आज की पीढ़ी पिछली पीढ़ी के साथ सवेदानाम्क स्तर पर जुडी नहीं दिखती द्य कहानी में माँ की पीड़ा, संत्रास और भय स्पष्ट दिखाई देता है द्य चीफ घर आने से

पहले माँ एक समस्या थी, वही तब जरूरी बन जाती है माँ के हाथ की बनाई फुलकारी चीफ को पसंद अति है द्य शामनाथ माँ को नया फुलकारी बनाने के लिए आग्रह करता है तो माँ अपने कमजोर आँखे और अपने बुढ़ापे के कारण फुलकारी बनाने के लिए मना करती है द्य लेकिन बेटे के उज्वल भविष के लिए फुलकारी बनाने के लिए मान जाती है द्य अंत में वह फुलकारी चीफ को पसंद आ जाती है द्य स्पष्ट है आत्मीय रिश्ते के बीच हो रहे विचलन को भीष्म साहनी ने यथार्थ रूप से उजागर किया है द्य इन पंक्तियों में वृद्ध माँ अपने जीवन के अंतिम समय अपने परिवार के साथ बिताना चाहती थी, और अपने बेटे के पढाई के लिए अपने गहने बेचकर पढाया था कि बुढ़ापे में वहा आसरा बनेगा लेकिन बेटा अपने माँ के प्रति जो व्यवहार करता है अंत में अपने दुख को समेटकर वह से चले जाना ही उचित समज ती है द्य बुजुर्गों की परिस्थिति को दर्शाती हुई इस घटना से हम बुजुर्गों की स्थिति की गांभीर्यता को समझ सकते है द्य "हरिहर काका वह तो बिलकुल मौन हो अपनी जिन्दगी के शेष दिन काट रहे है द्य एक नौकर लिया है, वही उन्हें बनाता दृ खिलाता है द्य उसके हिस्से की जमीन में जितनी फसल जोती है, उससे अगर वह चाहते तो मौज की जिंदगी बिता सकते थे द्य लेकिन वह तो गूंगेपन का शिकार जो गए है द्य कोई बात कहो, कुछ पूछो, कोई जवाब नहीं द्य खुली आँखों से बराबर आकाश को निहारा करते है द्य सारे गाँव के लोग उनके बारे में बहुत कहते - सुनते है, लेकिन उनके पास अब कहने के लिए कोई बात नहींद्व" (३)

'मिथिलेश्वर' जी के 'हरिहर काका' उपन्यास के अंश से हम बुजुर्गों की स्थिति को यथावत समझ सकते है द्य वयस्क व्यक्ति पारिवारिक व सामाजिक, धार्मिक पंखण्डियों की प्रताड़ना सहते दृ सहते जीने की इच्छा ही छोड़ देते है द्य बुजुर्गों की हिम्मत टूट जाती है द्य कुछ कहने व सुनने की स्थिति में नहीं होते द्य जीवित रहकर भी मृत के समान उनकी दशा हो जाती है द्य

साहित्य के माध्यम से हम आज की इस गंभीर समस्या को समझ सकते है द्य जिस पेड़ ने छाया दी उसे क्यों नई पीढ़ी दुत्कारती है ? उससे उभरने के लिए हमें उचित प्रयास करने चाहिए प्रत्येक परिवार की जड़ ही बुजुर्ग है उन्हें मजबूती प्रदान करने का परम कर्तव्य हमारा है द्य

निष्कर्ष :-

निष्कर्ष स्वरूप से कह सकते हैं, वृद्ध-विमर्श का दौर आरंभ हो चुका है छ अनेक साहित्यकारों ने वृद्धों की दयनीय अवस्था को उभारने का प्रयास किया है छ अंतरराष्ट्रीय बुजुर्ग दिवस भी मनाकर समाज के अनुभवी स्तंभ को मजबूती देने का प्रयास जमीनी रूप से किया जा रहा है छ
"यदापि पोष मातरं पुत्रय प्रभुदितो ध्यान,
इतदग्रे अनृणो भवाम्याहतौ पितरौ ममाः छ"

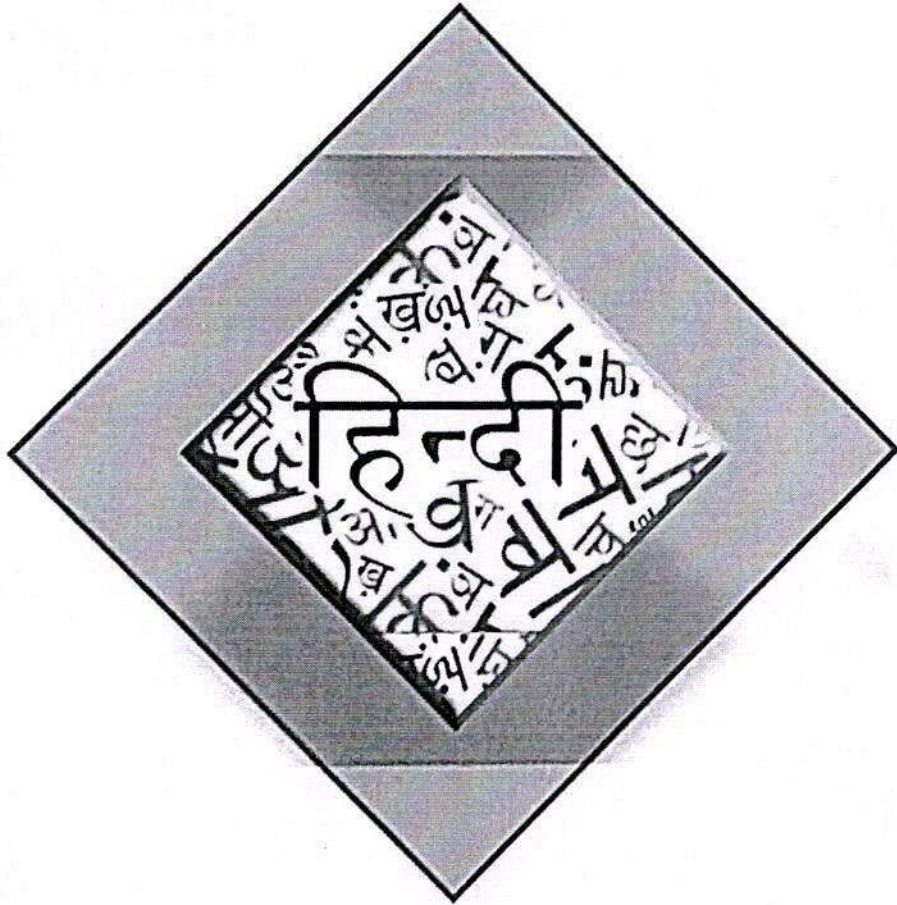
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संपादक

डॉ. सीमा कुमारी चौधरी



हिंदी साहित्य और संस्कृति
HINDI SAHITYA AUR SANSKRITI
By *Dr. Seema Kumari Chaudhary*
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‘आंगन में एक वृक्ष’ उपन्यास का विश्लेषण

डॉ. शिराजोदीन

सहायक प्राध्यापक

हिंदी विभाग

कर्नाटक कला, विज्ञान एवं वाणिज्य महाविद्यालय,

बीदर

शोध सारांश

‘कभी-कभी चन्दन पर साँपों का विष लग जाता है। इसे थोड़े पानी की जरूरत है।’ हिंदी के प्रसिद्ध साहित्यकार दुष्यंत कुमार का उपन्यास ‘आंगन में एक वृक्ष’ एक महत्वपूर्ण उपन्यास है। जिसके माध्यम से भारतीय समाज में सामंतवाद की जड़ों तक पहुँचकर उसके भयावह रूप से परिचित हो सकते हैं। इस उपन्यास की कहानी भले ही उत्तर भारत की हो लेकिन यथार्थ पूरे भारत वर्ष का है। इस उपन्यास की कहानी के केंद्र में चन्दन है। जिसके स्वभाव में केवल ऐयाशी बसी हुई है। शिकार, शराब, म्यूजिक का आदी बना हुआ है। और इन्हीं आदतों की वजह से खुद को समाप्त कर देता है। जिसकी संपत्ति पर चौधरी साहब, लल्लू और माँ अपना जीवन व्यतीत करते हैं।

बीज शब्द : हिंदी उपन्यास, दुष्यंत कुमार, सामंतवाद, जमींदारी व्यवस्था, भारतीय समाज आदि।

शोध प्रविधि : शोध की विश्लेषणात्मक पद्धति के साथ-साथ सामाजिक आलोचना आदि का प्रयोग।

मूल आलेख : दुष्यंत कुमार एक बहुमुखी प्रतिभा संपन्न रचनाकार थे। इन्होंने साहित्य की विभिन्न विधाओं के माध्यम से अपनी प्रतिभा और साहस का परिचय दिया है। दुष्यंत कुमार ने हिंदी कथा साहित्य को तीन महत्वपूर्ण उपन्यास दिए हैं। जिनमें 'आंगन में एक वृक्ष' उपन्यास भी महत्वपूर्ण है। सन् 1968 में लिखित यह उपन्यास चार खंडों में विभाजित है। इस उपन्यास को लघु उपन्यास भी कहा जा सकता है। दरअसल यह 144 पन्नों में समाया हुआ है। इस उपन्यास की कथावस्तु भारतीय सामंती परिवार और उसके परिवेश का यथार्थ चित्रण प्रस्तुत करती है। उपन्यास पर चर्चा करने से पहले मैं समझता हूँ सामंतवाद को समझना उचित होगा। रामशरण शर्मा लिखते हैं - "इस प्रथा के अधीन किसान भूमि से बंधे होते थे, और भूमि के मालिक जमींदार होते थे जो असली काश्तकारों और राजाओं के बीच की कड़ी का काम करते थे।"¹ संक्षेप में कहा जाए तो सामंतवाद वह व्यवस्था है, जिसमें राज्य की भूमि बड़े जमींदारों के कब्जे में होती है। सामंतवादी न केवल गरीबों, किसानों, कमजोरों आदि का शोषण करते हैं बल्कि अपने घर के नौकरों और स्त्रियों का भी शोषण करते हैं। इस उपन्यास के माध्यम ऐसी सामंती व्यवस्था का दुष्यंत कुमार ने पर्दाफाश करने का प्रयास किया है। दरअसल परम्परावादी व्यवस्था, सोच और सत्ता से मुठभेड़ करना तथा समाज को परिवर्तन की दिशा देना इनके लेखन का उद्देश्य रहा है। बात की जाए इस उपन्यास की तो इसकी कथा चन्दन से शुरू होकर चन्दन पर ही खत्म होती है। चन्दन सामंतवाद का वह चेहरा है जो अपने जीवन में हमेशा मदमस्त रहता है। म्यूजिक, नशा और शिकार का शौकीन चन्दन जब भी मुरादाबाद से अपने घर आता तो खुशियों का माहौल बन जाता। इस सन्दर्भ में चन्दन का भाई लल्लू कहता है - "चन्दन भाई साहब आते तो मेरे लिए घर में नुमाइश-सी लग जाती। रंग-बिरंगे कपड़े, अजीबो-गरीब खिलौने, जापानी पिस्तौल और गोलियां और इनके अलावा खूबसूरत डिब्बों में बंद टाफियां व चाकलेट और यह सब मेरे लिए।"² चन्दन अपनी सौतेली माँ और छोटे भाई लल्लू से बहुत प्रेम करता है। इसीलिए वह दोनों के लिए उपहार लेकर आता है। स्वभाव ऐसा कि घर में सभी से खूब मस्ती करता है। अपने छोटे भाई लल्लू को अपने से चिपटा कर कहता है - "यह तय रहा कि दोपहर में म्यूजिक, शाम को शिकार और रात में यादराम के हाथ के परांठे और तीतर"³ यादराम चन्दन का खानसामा था। इसलिए वह मुरादाबाद से चन्दन के साथ ही आता है। शाम को जब यादराम परांठे बनाते समय लल्लू पूछता

है - “क्यों यादराम, तेरी चाँद के बाल कहाँ गए?”⁴ यादराम का एक ही जवाब होता था - “बाबूजी के जूते चाट गए”⁵ भले ही यह बातें मस्ती के मूड में कही गई हों, लेकिन सामंती सोच का परिचायक हैं। घर में भी माता को यादराम पसंद नहीं था। उसके बनाए हुए भोजन पर आपत्ति जताती थी। लेकिन चन्दन, लत्तू और पिताजी को उसके परांठे बहुत पसंद थे।

इस उपन्यास में ज्यादातर चन्दन के चरित्र पर चर्चा की गई है। दरअसल डेढ़-दो हजार आबादी वाली बस्ती में जब भी वह आता था तो यही जिक्र हुआ करता था - “देखो कितना बड़ा आदमी है, मगर घमंड छू तक नहीं गया!”⁶ लोग अपने-अपने तरीके से चन्दन के व्यक्तित्व का चरित्र चित्रण करते हैं। भिक्खन चमार किस्सागोई अंदाज में चन्दन की कहानियां सुनाता है। चन्दन को मांस खाना और शिकार पसंद था। भिक्खन कहता है - “उस दिन सुबह-सुबह बन्दूक लिए हुए आ गए। बोले-‘क्यों मूविं रेडिओ-टेसन, अकेले-अकेले माल उड़ा रये हो!’ मैंने कहा - ‘बाबू, माल कहाँ, खिचड़ी है, तुम्हारे खाने की चीज नई।’ मैंने जो लुकमा बनाने के लिए थाली की तरफ हाथ बढ़ाया, सूं-सूं करता हुआ एक कच्चा भड़ाक से थाली में आके गिरा।”⁷ देवीसहाय भी चन्दन के निशाने की तारीफ करते हुए तबले के ठोकने, हारमोनियम के स्वर मिलाने और आलाप लेने पर मुग्ध थे। देवीसहाय कहते - “ओक्खोजी, क्या चीज सुनाई है, भाई चन्दन! कहाँ से मार दी?”⁸ मंडावलीवाली भाभी भी चन्दन की महानता के किस्से सुनाती थी। और उसकी बड़ी-बड़ी आँखों, रंग रूप, सौन्दर्य और शरारतों का हाव-भाव सहित वर्णन करती थी। इन तमाम चीजों के साथ-साथ चन्दन शराब पीने का भी आदी था। एक दिन चन्दन के पिताजी बिजनौर की जिला कचहरी से आकर बैठे ही थे चार-पांच आदमी चन्दन को कंधे पर लादे हुए चबूतरे पर चढ़े। उन्हें वहीं चारपाई पर लिटा दिया। सभी लोगों को लगा कि चन्दन मर गया है। लेकिन वह मरा नहीं था बल्कि नशे में बेसुध पड़ा था। और थोड़ी देर बाद उलटियां करने लगा। इस दृश्य को देख कर पिताजी का गुसा फूटा और वे चन्दन को गालियाँ देने लगे- “हरामजादे, आज मैं तुझे पिलाऊँगा! साले ने जिन्दगी को शराबखाना बना लिया है। सूअर के बच्चे, बदजात! आज मई तेरी खाल खीचकर भुस भर दूँगा।”⁹ चन्दन की दर्द-भरी अवाज़े ‘पिताजी, अब नहीं पीऊँगा... पिताजी, अब माफ कर दीजिए’ आवाज़ें गूँज रही थी। चन्दन के इतने सारे प्रशंसक होने के बावजूद किसी की हिम्मत न हुई कि बीच-बचाव करें। माँ भले ही सौतेली थी, लेकिन चन्दन को

बचाने की हिम्मत दिखाई। गुस्से में आकर कहने लगी - "यह राक्षस शराब पीकर मेरे बच्चे को जान से मारने पर तुला है!"¹⁰ इस समय चन्दन के पिताजी का गुस्सा आसमान पर चढ़ गया था। चिल्लाकर कहा- "हरामजादी, तू यहाँ क्या करने आई है? तेरा क्या मतलब है यहाँ आने का?"¹¹ इसके प्रत्युत्तर में माँ ने कहा - "मेरा क्या मतलब है...? मेरी कोख का जाया नहीं है, तो मेरा कुछ भी नहीं? मैं सीतेली माँ हूँ तो उसे मर जाने दूँ? राक्षस...जालिम... मुझे ये मालूम नहीं था कि सगा होने का यह मतलब होता है! अगर तू इसका सगा है तो ईश्वर की कसम, मैं सीतेली बहुत अच्छी हूँ...।"¹² इस पात्र के माध्यम से दुष्यंत कुमार स्त्री की संवेदनशीलता और ममता को उद्घृत करने का प्रयास किया है। इस सामंती परिवार में एक कठोर स्वभाव का पुरुष है तो दूसरी तरफ मातृत्व के प्रेम को भी देखने को मिलता है। इसी सन्दर्भ में मुंशीजी अपने पति से संबोध करते हुए आक्रोश व्यक्त करते हुए कहती है - "खुद तो उचक्की करते हैं और लड़के से आशा करते हैं साधु बनाने की।"¹³ अतः इस घटना के बाद चन्दन वीसलपुर चला जाता है। यहाँ चन्दन को छोटे सरकार और यहाँ की जनता को रियाया कहा जाता था। चंचल स्वभाव के इस व्यक्तित्व के सन्दर्भ में शिकार से अधिक शराब और नटनियों के किस्से सुनाई पड़ते थे। इस तरह से उपन्यास के पहले खंड में चन्दन और उसके पारिवारिक पृष्ठभूमि पर प्रकाश डाला गया है। उपन्यास का दूसरा खंड भी रोचक है। जिसमें कथानक अपने पिताजी के अतीत के अनछुए पहलुओं को उजागर करता है। इस खंड में अधिकतर चन्दन के निहाल पर अलग-अलग रूपों में चर्चा की गई है। दरअसल कुछ लोगों का मानना था कि मुरादाबाद के जमींदार और प्रसिद्ध वकील चौधरी रामप्रसाद की दो लड़कियाँ थीं। अशर्फी कुंवर और कनक कुंवर। वकील साहब ने दोनों लड़कियों की परवरिश लड़कों की तरह की थी। उनकी हर ख्वाइश पूरी करने के लिए पीछे नहीं हटते थे। उस जमाने में बड़े घर वालों अर्थात् जमींदारों के यहाँ कुँवारी और जवान लड़कियों को घर में रखने की प्रथा नहीं थी। इसीलिए अशर्फी कुंवर का विवाह कर दिया गया था। और वह विवाह के तीसरे दिन अपनी नौकरानी के साथ अकेली ससुराल चली गई थी। फिर कभी अपने मायके वापस न जाने की घोषणा की। वकील साहब ने अपनी छोटी लड़की कनक कुंवर का विवाह एक छोटे परिवार में किया और लड़के को घर-दामाद बनाकर वहीं बुला लिया था। इस विवाह के सन्दर्भ लल्लू के पिताजी का कहना कुछ और ही था। लल्लू उर्फ कथानक की यह बात उल्लेखनीय है -

"पिताजी का कहना था कि बाबाजी की मृत्यु हो चुकी थी और घर की सारी जायदाद वर्ज में दबी थी, इसलिए वे कचहरियों की खाक छानने और मुकदमों के तांब-पेंच सीखने के लिए वहां चले गए थे।"¹⁴ उनकी बात के समर्थन में ओखलो भाई साहब कहा करते थे इस खानदान का क्या रूतबा था कि रामप्रसाद जैसे वकील ने यहाँ आकर माथा टेका! दादाजी के घुटने पकड़ लिए थे। इसी कड़ी में लल्लू की माता जी का मानना अलग था। एक दिन लल्लू के पूछने पर उन्होंने बताया - "तेरे पिताजी वकील साहब के दामाद थे और किशोर अवस्था में ही घरजमाई के रूप में वहां रहने लगे थे। चन्दन का जन्म, शादी के चार साल बाद वहीं हुआ था और उनके जन्म के साथ ही उसकी माँ अर्थात् तेरे पिताजी की पहली पत्नी स्वर्ग सिधार गई थीं। चन्दन का पालन-पोषण भैनाजी के किया था।"¹⁵ वकील साहब की बड़ी लड़की अशर्फी कुंवर को ही भैनाजी कहा जाता था। चन्दन अपनी मासी भैनाजी के इतने लाड़ले थे कि दूसरा कोई उन्हें प्यार करे या वे स्वयं किसी दुसरे को प्यार करें, यह भैनाजी को पसंद नहीं था। लल्लू कथा है - "माँ ने भूल और भावुकतावश एक बार भाई साहब को अपने पास विठाकर खिला दिया था। वस, उसी दिन भैनाजी का कहर टूट पड़ा था। उसी दिन माँ ने उस घर में अपनी स्थिति का अनुमान लगा लिया था।"¹⁶ दरअसल चंदन की माता की मृत्यु के बाद खुद वकील साहब ने अपने दामाद का दूसरा विवाह करवाया था। सीतेली माँ होने के बावजूद भी वह चंदन को अपनी संतान मानकर उससे बहुत प्रेम करती थी। लेकिन यह बात भैनाजी को पसंद नहीं थी। एक दिन भैनाजी ने कहा - "आगे इसे हाथ मत लगाना। मैं बताए देती हूँ। मैं नहीं चाहती, इस पर ओछे लोगों की छाया पड़े।"¹⁷ इससे पता चलता है कि भैनाजी कितनी घृणा करती है। भैनाजी का व्यवहार नववधू के साथ ठीक नहीं था। लगातार घर का काम करवाती थी। साथ ही कपड़ों पर कढ़ाई का काम भी कराया करती थी। यहाँ तक कि बूढ़ी रामकली (भैनाजी की नौकरानी) दाल में चावल मिलाकर रख दिया करती थी। दरअसल भैनाजी का मानना था कि काम में लगे रहने से जवान बहू-बेटियों का मन कुमार्ग पर नहीं जाता। अतः इस व्यवहार से अंदाजा लगाया जा सकता है कि सामंती परिवार में बर्चस्व कायम करने तथा स्त्री शोषण चरम सीमा पर होता है। लल्लू की माता का शोषण और अत्याचार सह कर बुरा हाल हो चुका था। दरअसल लल्लू के पिताजी घर आते नहीं थे। जब कभी घर आते उनसे बातें करने की हिम्मत नहीं होती थी। एक बार हिम्मत जुटा कर अपनी बेदना सुनाई।

लेकिन उन्होंने जवाब में कहा- "तो क्या मैं जनाब के लिए अलग से खिदमतगारनी रखूंगा? अरे, भैनाजी को पटाकर रखो, सेवा से तो पत्थर भी पिघल जाता है।"¹⁸ इसी दौरान पूरे चार साल से बीमार पलंग पर पड़े रहे वकील साहब का देहांत हो गया। इनके देहांत के बाद घर का वातावरण बदल रहा था। और जीवन शैली भी। भैनाजी हमेशा चन्दन के सामने उसकी सौतेली माँ और पिताजी को नीचा दिखाती रहती है। एक बार चन्दन की ओर इशारा करते हुए कहा था- "मुझे तो बस इसका खयाल है। माँ सौतेली है। बाप शराबी और रंडीबाज है। सब उड़ा देगा। इसके लिए कौड़ी नहीं बचेगी।"¹⁹ लाला शांतिस्वरूप कारिन्दा भैनाजी को विनम्र और रहस्यात्मक स्वर में 'भैनाजी एक जरूरी बात है' कहकर कमरे में ले गया। वहाँ वसीयत के संबंध में बातें हुईं। दरअसल वसीयत में लिखा था कि वकील साहब की सारी जमीन और जायदाद का वारिस चन्दन होगा। इसके बाद भैनाजी का व्यवहार बदल गया। अगले दिन सुबह माँ ने देखा कि 'हरदेई' घर का सारा काम करके सेवा में हाथ बांधे कड़ी है। इस परिवार में ऐसा पहली बार हो रहा था। माँ ने हरदेई से इस परिवर्तन का कारण जाना। हरदेई ने लाला शांतिस्वरूप कारिन्दा की ओर इशारा करके कहा- "कुछ वसीयत को लेकर बातें हो रही थीं। मिठवा बड़ा दुखी था। कह रहा था, अदालत में यह साबित करना मुश्किल है कि वसीयत लिखते समय उनके होशो-हवास दुरुस्त नहीं थे। बस, एक ही तरीका है कि आप दोनों को अपनी मुट्ठी में रखें। बाहर न जाने दें।"²⁰

जमींदारी और जायदाद के लालच में चन्दन के पिताजी वकील साहब के अंतिम समय में खुद चन्दन के नाम वसीयत लिखकर उनसे हस्ताक्षर करवाते हैं। इसीलिए वह निश्चित रहते हैं कि एक दिन सारी जमीं और जायदाद चन्दन की ही होगी। और उसपर यह राज करेंगे। चन्दन के पिताजी जमींदारी और जायदाद के साथ-साथ मुरादाबाद से निकल कर बीसलपुर आना चाहते थे। और एक दिन भैनाजी की हवेली से निकल कर अपने गाँव बीसलपुर वापस आ गए। समय बीतता गया और परिस्थितियाँ भी बदलती गईं। खास तौर से चन्दन का चरित्र। इसे शराब और शिकार का चस्का लग गया था। हालात ऐसे हो चुके थे कि चन्दन का अधिकतर समय बाहर ही बीतता था, घर बहुत कम आया करता था। ज्यादातर शराब पीकर बाहर पड़े रहता था। चन्दन के बारे में पिताजी बड़े चिंतित रहते थे। दरअसल चन्दन अपने दोस्तों और शराब पर पैसे बहुत खर्च कर रहा था। यहाँ तक कि दूसरों से पैसे उधार लेने लगा था। गाँव से जब वह मुरादाबाद

चला गया, वहां भी यही स्थिति रही। दो महीने बाद मुरादाबाद से चन्दन का पत्र मिला था। जिसमें लिखा था कि पिछले दो सप्ताह से बीमार है और ज्यादा शराब पीने के कारण आंते कट गई हैं। अब उसके बचने की उम्मीद नहीं थी। डाक्टरों ने शराब से दूर रहने के लिए कहा था। लगातार चौधरी साहब भी उसकी निगरानी में थे। एक दिन सोरन ने एक बोतल देसी शराब की लाकर दी। उससे हालत बहुत बिगड़ गई। अंततः चन्दन ने अंतिम सांस ली। वातावरण में फूट-फूट कर रोने की आवाजें गूंजने लगी थी।

निष्कर्षतः कहना चाहूंगा कि दुष्यंत कुमार ने सामंतवाद के प्रभाव से घर-परिवार के बिखराव और पारिवारिक विघटन को चित्रित करने का प्रयास किया है। ऐसी व्यवस्था और मानसिकता के चलते समाज में असमानता बनी रहेगी। जिससे उभरने का प्रयास करना चाहिए। चन्दन सामंतवाद का एक ऐसा चेहरा है, जिसे परिवार के भीतर स्वीकार नहीं किया जाता। इसीलिए माँ चन्दन की जीवन शैली का प्रभाव अपने बेटे लल्लू पर नहीं चाहती। अतः चन्दन की मृत्यु केवल मृत्यु नहीं है बल्कि सामंतवाद का अंत और पूंजीवाद की शुरुआत है।

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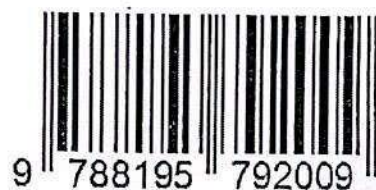
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Health hazards by using mobile cellular phones

Somnath biradar,
Department of electronics,
Karnatak Arts, Science and Commerce College, Bidar

Abstract:-

Maximum usage of mobile phones worldwide because of advances in mobile phone technology. Even the mobile becomes an general tool for all persons for communication, playing games, watching videos and audio songs. However the impact of regular use of mobile phones has raised concern about the potential health hazards. Here we tried to explore the major harms of cell phone usage at different stages of life and accordingly suggestions for safe usage have been proposed to minimize their impact on health.

Introduction:-

From 1990 onwards the use of mobile phone has increased rapidly. From first year onwards every researcher tried to find out the actual hazards to human health due to mobile phone radiation. Also have serious public safety concern about the exposure of public in front on radio frequency (RF) and microwave (MW) field from hand held. Because the mobile phones use electromagnetic radiation in the microwave range. Some national and international organizations have established guidelines for human exposure to radio frequency energy.

The serious health effect (e.g. cancer) is very unlikely to be caused by cellular phones. Too many harmful diseases such as brain tumor, male infertility, ear hearing impairment, effect on the fetus, Alzheimer's decease, Parkinson's disease, asthma, heart trouble, insomnia, high blood pressure, leukaemia, birth effects and immune system. The WHO organization serious about scientific and medical communities.

Back ground:-

This article addresses the safety of exposure to radio frequency (RF) radiation from hand held communications devices with particular references to cellular telephone handsets.

Several considerations must be taken in to account of hazards from exposure to wireless transmitters. The first consideration is frequency. Wireless communication operates in a variety of frequency ranges as.

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The heat transfer effects of MHD Boundary Layer Flow of Jeffrey Fluid over a Stretching/Shrinking SHEET through Porous Medium by HAM Method

Padmini K and J.V. Tawade

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Department of Engineering Sciences, Vishwakarma University, Kondhwa (BK),Pune (M.S.), India

Abstract

The study of heat transfer the presence of a porous media, the magnetohydrodynamics boundary layer flow of Jeffrey fluid over a permeable stretching/shrinking sheet is studied. The controlling partial differential equations are reduced to nonlinear ordinary differential equations and solved using the HAM technique employing similarity transformations. The effects of magnetic parameter, permeability parameter and Jeffrey parameter on velocity profiles while the local skin friction coefficients are calculated.

Keywords: Jeffrey parameter, boundary layer MHD, permeability parameter, prantal number

Introduction

The study of heat transfer on viscous fluid flows, conjunction with heat transfer, over the sheet which is continuously stretching / shrinking in nature is of tremendous significance under engineering and manufacturing sections like fibre production, polymer sheets extrusion, crystal growing, etc. Further, the production of the quality sheet through manufacturing processes in the polymer industry is largely dependent on the cooling rate. As a consequence, significant efforts have been taken by a variety of researchers in the last decades to change the flow kinematics in order to ensure a better control of cooling rate. With and without slip regime at the surface, many researchers have been investigated the permeable stretching/shrinking sheet. However, the seminal work in this field has been done by Sakiadis [1, 2, 3], who did in-depth analyses of the boundary layer equations and assumptions governing the flows on continuously stretching surfaces.

Sarpakaya [4] was the first to investigate the non-Newtonian fluid MHD flow. In Newtonian fluids, Prandtl's boundary layer theory has shown to be quite valuable, since Navier-Stokes equations may be translated into much simpler boundary layer equations that are much easier to manage.

Crane [5] was the first to analyze, among other things, the steady two-dimensional flowing of a Newtonian fluid controlled by a stretched elastic flat sheet flowing in its own plane with a velocity that changes linearly with distance from a fixed point. Following that, other studies, such as Refs. [6-11], were conducted into

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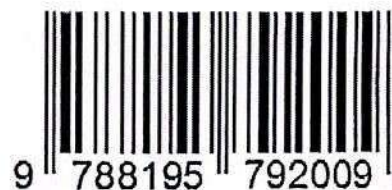
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Impact of the Covid-19 Pandemic on Higher Education Students' Life: A Survey

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Karnatak Arts, Science and Commerce College, Bidar

Abstract

This article aims to study the impact of the COVID-19 pandemic on student life during the first and second waves, including teaching and learning, social contacts, and how students cope emotionally in different parts of the Gulbarga University, Kalaburagi. In this survey, 1211 students participated among these 627 males and 584 females. This study will help to create the best recommendations for policymakers and higher education institutions on how can we support students in such crises in different environments, such as economic, social, cultural, political and institutional.

Introduction

In the space of just few months in early 2020, the COVID-19 pandemic caused by the novel corona virus has radically transformed the lives of people around the globe, including higher education students. Apart from the devastating health consequences on people directly affected by the virus, the COVID-19 pandemic has had major implications for the way higher education students live and work, affecting their physical and mental well-being in a profound way. To capture the immediate economic and social effects of this crisis on the life of students of higher education, the Department of Statistics of Karnatak Arts, Science and Commerce College, Bidar has launched a University level online survey across the affiliated colleges of Gulbarga University, Kalaburagi during 2nd June 2021 to 6th August 2021.

Respondents Opinion Analysis

A statistical survey is undertaken by the Dept of Statistics in association with the Dept of Computer science of the college, to study the impact of Covid-19 over the higher education sector. This survey aimed to know the impact of Covid-19, over education sector in Kalyan-Karnataka Region, Where Gulbarga University is situated. Hence the respondents were taken from this region. A questionnaire consisting of 31 questions was uploaded on the college website.

1. A total of 1211 online responses were received from the respondents, of which (627) were males & the remaining (584) were females.
2. It was difficult for the students to get admitted to the college; since there were several conditions

- & rules for travelling from villages & local areas (60.8% expressed difficulty). So also, the people's economic situation worsened due to the pandemic.
3. However, the major portion of the syllabi were covered till June 2020 (partially offline & partially online).
 4. Out of 1211 respondents, 70% of them believe that promoting to the next semester/year was an appropriate decision of the Govt. because to overcome the inconvenience caused for conducting exams and mental pressure built up due to the spread of the pandemic & deaths caused by the epidemic in the society.
 5. It is agreed by 60% of the students that psychological pressure during the covid-19 period was high.
 6. During the covid-19 period, the university's decision regarding admission & fee structure was relatively moderate (It first followed the directions of the State Govt).
 7. Moderate strength of students (55%) utilized the facility provided by SSP portals to apply for the scholarships.
 8. The colleges have provided a better (74%) environment.
 9. Colleges (86%) have taken sufficient precautionary measures to manage covid-19.
 10. During the maximum pandemic, colleges (91%) have engaged in online classes.
 11. Majority of the students (65%) felt difficulty in attending the online classes (May be due to the non-availability of android phones, power breaks, network coverage etc.).
 12. Outcome of the online classes was poor. It may be because of poor network coverage & lack of concentration.
 13. Many students (69%) felt difficulty paying fees due to the Covid-19 pandemic.
 14. Only a few colleges (21%) gave fee concessions during Covid-19.
 15. A majority of students (77%) expressed their inability to concentrate on online classes (May be due to interruptions & network problems).
 16. Nearly 80% of students expressed a significant setback in their education development during the period of covid-19.
 17. Covid-19 had a significant impact on the educational systems & their activities accepted by 85% respondents.
 18. A Moderately good number of students (55%) got vaccinated in the initial stage after the vaccine in India for covid-19.
 19. Sufficiently good strength (92%) felt vaccinations are the better remedy for covid-19.
 20. Almost 97% of the students said they used preventive measures in their homes.

21. Almost 90% of the respondents expressed their happiness about the reasonable efforts that were made & services given by State Govt (Karnataka Govt) during 1st & 2nd waves of covid-19.
22. The efforts made by the state govt & central govt to maintain. The quality of education & its schedule were insufficient.
23. The efforts made by the central govt during the 1st wave & 2nd wave of covid-19 were moderate but failed to satisfy cent per cent expectations.
24. Moderate change in the willpower and attitudes of the teachers in observed during covid-19.
25. Majority of responses supported the loss of lives of a few teachers and classmates due to covid-19.

Table 1: Statistical information about the Survey

No. of colleges participated	36 colleges from 4 districts
No. of Questions	31
No. of Students	1211
No. of Male students	584
Number of Female students	627
Period of the Survey	2/6/21 to 6/8/21

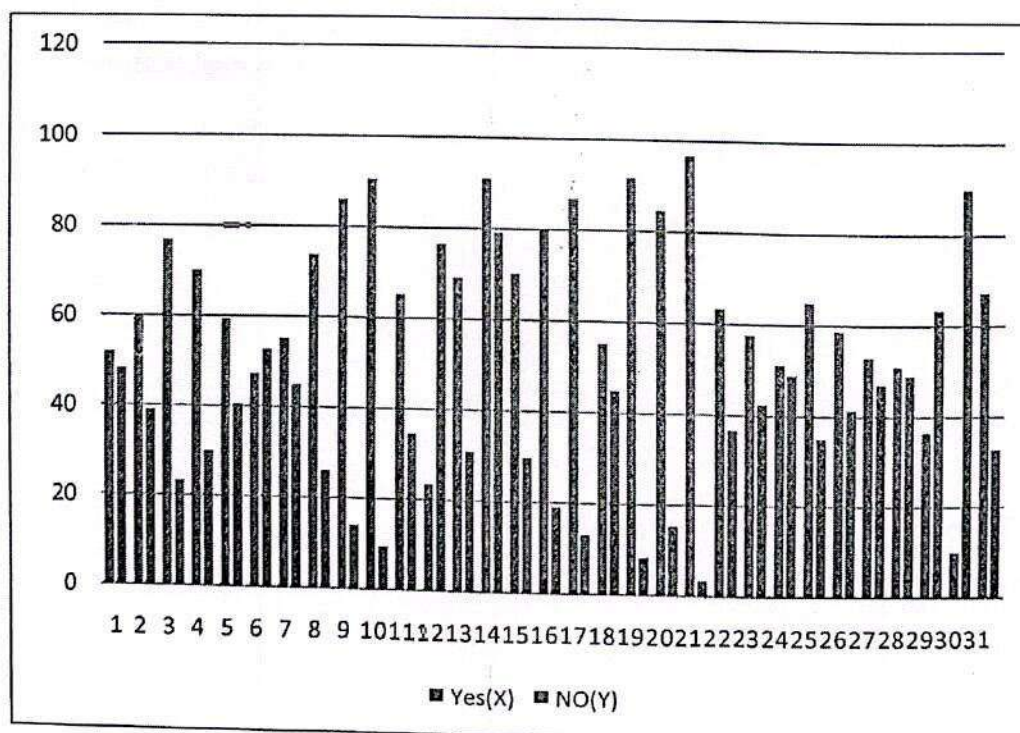


Figure 1: Bar chart of responses of 1211 students for 31 questions.

Table 1 Responses to various questions in Covid-19 Survey

Q.No	Yes(X)	NO(Y)
1	51.8	48.2
2	60.2	39.2
3	76.8	23.3
4	70.0	30.0
5	59.4	40.6
6	47.3	52.7
7	55.1	44.9
8	73.8	26.2
9	86.0	14.0
10	90.4	9.6
11	65.3	34.7
12	23.5	76.5
13	69.1	30.9
14	90.8	79.2
15	70.2	29.8
16	80.1	19.1
17	86.8	13.2
18	55.1	44.9
19	91.7	8.3
20	84.6	15.4
21	96.7	3.3
22	63.3	36.7
23	57.6	42.4
24	51.1	48.9
25	64.9	35.1
26	58.6	41.4
27	53.0	47.0
28	51.0	49.0
29	36.5	63.5
30	10.0	90.0
31	67.3	32.7

This bar chart is the supporting tool for what analysis we have listed above. For example, the yes response to question 17 revealed an 85% impact on the student's life due to Covid-19. Similarly, you can realize from the above bar chart that question number 21 indicates 98% satisfaction with the measures taken by the Central Govt. During phases 1 and 2 . Another exciting fact is that still, technically, most colleges have failed to connect the students online to deliver a lecture. From the responses, it is evident that IT has yet to reach the country's rural areas because several rural area students cannot access online classes due to networking and non-affordable, intelligent mobiles.

Null Hypothesis: Ho: There no impact of Covid-19 on the life of students studying in higher education.

Table 2: Shows the calculation of T Test

Q.No	Yes (X)	Diff (X - M)	Sq. Diff (X - M) ²	NO (Y)	Diff (X - M)	Sq. Diff (X - M) ²
1	51.8	-12.65	160.06	48.2	10.44	108.90
2	60.2	-4.25	18.08	39.2	1.44	2.06
3	76.8	12.35	152.48	23.3	-14.46	209.22
4	70.0	5.55	30.78	30.0	-7.76	60.29
5	59.4	-5.05	25.52	40.6	2.84	8.04
6	47.3	-17.15	294.18	52.7	14.94	223.07
7	55.1	-9.35	87.45	44.9	7.14	50.92
8	73.8	9.35	87.39	26.2	-11.56	133.74
9	86.0	21.55	464.33	14	-23.76	564.75
10	90.4	25.95	673.32	9.6	-28.16	793.24
11	65.3	0.85	0.72	34.7	-3.06	9.39
12	23.5	-40.95	1677.03	76.5	38.74	1500.44
13	69.1	4.65	21.61	30.9	-6.86	47.12
14	90.8	26.35	694.24	79.2	41.44	1716.90
15	70.2	5.75	33.04	29.8	-7.96	63.43
16	80.1	15.65	244.87	19.1	-18.66	348.36
17	86.8	22.35	499.45	13.2	-24.56	603.42
18	55.1	-9.35	87.45	44.9	7.14	50.92
19	91.7	27.25	742.47	8.3	-29.46	868.16
20	84.6	20.15	405.96	15.4	-22.36	500.17
21	96.7	32.25	1039.96	3.3	-34.46	1187.80
22	63.3	-1.15	1.33	36.7	-1.06	1.13
23	57.6	-6.85	46.94	42.4	4.64	21.49
24	51.1	-13.35	178.27	48.9	11.14	124.00
25	64.9	0.45	0.20	35.1	-2.66	7.10
26	58.6	-5.85	34.24	41.4	3.64	13.22
27	53.0	-11.45	131.14	47.0	9.24	85.29
28	51.0	-13.45	180.95	49.0	11.24	126.24
29	36.5	-27.95	781.29	63.5	25.74	662.32
30	10.0	-54.45	2964.98	90.0	52.24	2728.55
31	67.3	2.85	8.11	32.7	-5.06	25.65

Difference Scores Calculations

Yes Response(X)

$$N_1: 31$$

$$df_1 = N - 1 = 31 - 1 = 30$$

$$M_1: 64.45$$

$$SS_1: 11767.86$$

$$s^2_1 = SS_1 / (N - 1) = 11767.86 / (31 - 1) = 392.26$$

No Response(Y)

$$N_2: 31$$

$$df_2 = N - 1 = 31 - 1 = 30$$

$$M_2: 37.76$$

$$SS_2: 12845.31$$

$$s^2_2 = SS_2 / (N - 1) = 12845.31 / (31 - 1) = 428.18$$

T-value Calculation

$$s^2_p = \left(\frac{df_1}{df_1 + df_2} \right) s^2_1 + \left(\frac{df_2}{df_1 + df_2} \right) s^2_2 = \left(\frac{30}{60} \right) * 392.26 + \left(\frac{30}{60} \right) * 428.18 = 410.22$$
$$s^2_{M1} = s^2_p / N = 410.22 / 31 = 13.23 \quad p = 1$$
$$s^2_{M2} = s^2_p / N = 410.22 / 31 = 13.23 \quad p = 2$$
$$t = (M_1 - M_2) / \sqrt{(s^2_{M1} + s^2_{M2})} = 26.69 / \sqrt{26.47} = 5.19_{M2}$$

The *t*-value is 5.18751. The *p*-value is < .00001. The result is significant at *p* < .05. This statistical significance tells that the impact of the Covid-19 pandemic is significantly affected on the student's life studying in higher education. Hence, the null hypothesis is rejected and accepted the impact of Covid-19 on the students' life.

Conclusion

This survey has disclosed several insights into the impact of the Covid-19 pandemic on students' life and is statistically proven in the above discussion. In a different form, the effect of Covid-19 on students' life happened such as mental health, social, economic and emotional aspects. This survey helps lawmakers for framing the policy to overcome the issues arising from such pandemics.

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SACCHRIFICATION AND FERMENTATION OF SOME AGRICULTURE PRODUCTS BY SACCHROMYCES CEREVISAE FOR ETHANOL PRODUCTION

1. Dr. Vijaykumar Patil 2. Pooja Shrigiri

1. Saispoorthy college Bidar 2. Karnatak Arts science and commerce college Bidar.

ABSTRACT:

The fermentability of yeast with agricultural products (especially wastes) such as Sweet potato, Chikoo, Carrot, Beetroot, Striped and Unstriped Watermelon was carried out for knowing efficient ethanol production. Pulp of each with additional nutrients were prepared and sterilized. Such two sets of pulp samples made, i.e. one set with amylase (2g/pulp) and the other sets without amylase. Ethanol production rate was observed for 14 days. More production was found in pulp of Sweet potato followed by Beetroot, Arka akash watermelon, Chikoo, Sugar baby watermelon and Carrot. It was also observed that the rate of production of alcohol found significantly more in pulps with amylase than in without amylase.

Keywords: Fermentation, *Sacchromyces cerevisae*, Pulp, Ethanol, Fruits, Vegetables.

1. Introduction

Ethanol fermentation is a biological process in which biomass to be converted into liquid fuel can be derived from agricultural crops containing sugars, starch or cellulose. Ethanol can be produced in high amount using yeast from sugary and starchy materials whereas, less amount with lignocellulosic materials (Chahal, 1982 & Overend, 1982) due to lack of specific technologies.

Humans have used fermentation to produce drinks and beverages since the Neolithic age. Because yeasts perform fermentation in the absence of oxygen, alcoholic fermentation is considered an anaerobic process. Bioethanol production has been classified into different generations based on biotechnology developments and also in terms of the feedstock used. First generation bioethanol is produced from either corn or sugarcane. The released sugars, glucose and sucrose, respectively, are readily fermentable into ethanol by micro-organisms such as the yeast *Saccharomyces cerevisiae* (Buijs, et. al., 2013). Initial ethanol production from different wastes such as sugarcane (Fernandez-Lopez et al. 2012), sugar beet pulp (Kasavi, et. al., 2012), wastes of cassava (Akaracharanya et. al., 2011), food waste leachate (Leman, et. al., 2011), waste news papers (Xin, et. al., 2010) has been reported. Second generation biofuels are derived from more complex biomass, which can be grouped into roughly four categories, namely, wood residues, municipal solid waste, agricultural waste, and dedicated energy crops. Since wastes are cheap, it not only reduces or eliminates cost of disposal but also reduces cost of ethanol production. The cheapest & lignocellulosic agricultural residues were recently investigated to optimise lignocellulosic & starchy ethanol production (Zhang, et. al., 2011, Park, et. al., 2013, Tomas, et. al, 2013 and Rocha, et. al., 2014). Hence present study was carried out on fermentation of agriculture products by *S. cerevisiae* (bakers yeast). Because, yeasts are

ABOUT THE AUTHORS



Shivaleela Patil has completed M.Sc. (Computer Science) from B.V.B College, Bidar. She has been working as an assistant Prof. In the Department of Computer Science in Karnatak Arts, Science and Commerce College, Bidar from last 15 years to date. She has good knowledge of programming languages. She has attended several conferences and delivered more than 15 invited talks on use of ICT in teaching-learning. She has guided for more than 100 projects of BCA students.



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A Text Book on Java PROGRAMMING LANGUAGE

SHIVALEELA PATIL
SRIKANT DODDAMANI

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On the Approximate Solution of Fractional Fornberg–Whitham Equation Using New Iterative Method.

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Abstract

This paper presents the approximate solutions to solve the nonlinear Fornberg–Whitham equation with a time-fractional derivative arising in wave breaking. The equations' explicit solutions are solved with initial values using a new iterative method. The fractional derivatives are taken in the Caputo sense. The present method performs exceptionally well in terms of efficiency and accuracy. Numerical results for different particular cases of α are presented graphically. The results obtained are compared with the exact Solution.

Keywords: Time-fractional Fornberg–Whitham equation, New Iterative Method, Caputo derivative, Approximate Solution

1. Introduction

In recent years, fractional differential equations have been gaining importance owing to their applications such as visco-elasticity, feedback amplifiers, electrical circuits, electroanalytical chemistry, etc., [1–4]. The study of travelling wave solutions has become one of the critical issues in many areas of physics. Many nonlinear partial differential equations, such as the celebrated Korteweg–de Vries equation, the Camassa–Holm equation, etc., have been shown to have a variety of travelling wave solutions.

The Fornberg–Whitham equation was first proposed for studying the qualitative behaviour of wave breaking [5]. The Fornberg–Whitham equation can be written as

$$u_t - u_{xxt} + u_x = uu_{xxx} - uu_x + 3u_x u_{xx} \quad t > 0 \quad (1.1)$$

where $u(x, t)$ is the fluid velocity, α is constant and lies in the interval $(0, 1]$ t is the time, and x is the spatial coordinate. In 1978, Fornberg and Whitham obtained a peaked solution

$u(x, t) = Ae^{-\frac{1}{2} |x - \frac{4t}{3}|}$ with an arbitrary constant A [6]. Recently, the different types of Fornberg–Whitham equations in physics have been solved by Abidi and Omrani [7], Gupta and Singh [8], Lu [9], and Sakar et al. [10]. Chen et al. [11], Yin et al. [12], Zhou and Tian [13], He et al. [14], Jiang and Bi [15].

Modifying the nonlinear term uu_x in (1.1) to $u^2 u_x$, He et al. proposed in [16] the modified Fornberg–Whitham equation.

$$u_t - u_{xxt} + u_x = uu_{xxx} - u^2 u_x + 3u_x u_{xx} \quad (1.2)$$

Leveraging Information and Communication Technology (ICT) for Sustainable Agriculture

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I. Introduction:

The growth of Information and Communication Technology (ICT) has revolutionized various sectors, including agriculture. This research paper explores the applications of ICT in agriculture, its benefits, and its limitations. Additionally, the paper will discuss the role of ICT in addressing the challenges faced by the agricultural sector and providing opportunities for sustainable development. The inside text citations will provide support for the discussed concepts.

Agriculture plays a significant role in the global economy, contributing to food security, poverty reduction, and sustainable development (FAO, 2017). However, the sector faces numerous challenges, including climate change, water scarcity, and population growth (World Bank, 2020). Information and Communication Technology (ICT) offers a promising solution to address these challenges and promote sustainable agriculture practices (Klerkx et al., 2019).

II. Applications of ICT in Agriculture:

1. Precision Agriculture:

ICT enables precision agriculture by using technologies such as Global Positioning System (GPS), Geographic Information System (GIS), and remote sensing (Zhang et al., 2016). These technologies facilitate efficient resource management, crop monitoring, and decision-making, ultimately reducing input costs and increasing productivity (Liakos et al., 2018).

2. Agricultural Extension Services:

ICT can enhance agricultural extension services by providing timely and tailored information to farmers (Aker, 2011). Digital platforms such as mobile applications, SMS services, and social media

channels can disseminate relevant information on weather forecasts, crop management practices, and market prices (Saravanan et al., 2015).

3. Market Access and Value Chains:

ICT can improve market access and value chain efficiency by connecting farmers to buyers and providing real-time market information (Mittal & Tripathi, 2009). E-commerce platforms, mobile applications, and blockchain technology can facilitate seamless transactions, reduce transaction costs, and improve traceability (Tripathi & Mishra, 2017).

III. Benefits of ICT in Agriculture:

1. Enhanced Productivity:

The adoption of ICT in agriculture has been associated with increased productivity through the efficient use of resources, timely decision-making, and improved agronomic practices (Aubert et al., 2019).

2. Climate Change Adaptation and Mitigation:

ICT can help farmers adapt to climate change by providing real-time weather data and forecasting, allowing them to adjust their farming practices accordingly (Mudombi et al., 2020). Moreover, ICT can support climate-smart agriculture initiatives by promoting resource-efficient practices and reducing greenhouse gas emissions (Rosenstock et al., 2016).

3. Rural Development and Poverty Reduction:

ICT adoption can improve rural livelihoods by providing access to agricultural knowledge, market information, and financial services, ultimately contributing to poverty reduction (Duncombe, 2016).

4. Limitations and Challenges:

Despite the potential benefits of ICT in agriculture, several limitations and challenges persist, including the digital divide, limited infrastructure, and lack of digital literacy among farmers (Jansen et al., 2017). Additionally, concerns regarding data privacy and security need to be addressed to ensure the sustainable and responsible use of ICT in agriculture (EPRS, 2018).

IV. Conclusion:

Information and Communication Technology (ICT) has the potential to transform the agricultural sector by addressing key challenges and promoting sustainable development. The applications of ICT in agriculture, including precision agriculture, extension services, and market access, offer numerous benefits such as enhanced productivity, climate change adaptation, and rural development. However,

to maximize these benefits, it is crucial to address the existing limitations and challenges. Future research and policy efforts should focus on bridging the digital divide, improving infrastructure, and promoting digital literacy among farmers.

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The heat transfer effects of MHD slip flow with suction and injection and radiation over a shrinking sheet by Optimal Homotopy Analysis Method

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I. Abstract:

The current research examines boundary layer laminar flow using a porous surface that shrinks exponentially under changing magnetic fields, suction/injection, radiation on velocity, and thermal radiation. Governing partial differential equations and similarity transformations were also used to define the dimensionless nonlinear differential equations. The equations were solved analytically using the HAM method. An excellent agreement is observed in comparison with the available literature in the special case. The impact of different parameters like injection/suction, Prandtl number, radiation, velocity slip, thermal slip, as well as the magnetic field on different velocity and temperature values have been presented graphically, and have been discussed in detail.

Keywords: Thermal slip; velocity slip; heat transfer; exponentially shrinking sheet; suction/injection parameter; thermal radiation

II. Introduction:

The study of heat transfer on viscous fluid flows, in conjunction with heat transfer, over the sheet which is continuously stretching/ shrinking in nature is of tremendous significance under engineering and manufacturing sections like fiber production, polymer sheets extrusion, crystal growing, etc. Further, the production of the quality sheet through manufacturing processes in the polymer industry is largely dependent on the cooling rate. As a consequence, significant efforts have been taken by a variety of researchers in the last decades to change the flow kinematics to ensure better control of the cooling rate. With and without a slip regime at the surface, many researchers have investigated the permeable stretching/shrinking sheet. However, the seminal work in this field has been done by Sakiadis [1, 2, 3], who did in-depth analyses of the boundary layer equations and assumptions governing the flows on continuously stretching surfaces. The shrinking phenomena occur often in

many circumstances. A rising balloon is also an example of a shrinking phenomenon. On account of this fact, Wang [4] studied the unsteady shrinking sheet film first amongst all. But, Wang [4] could not provide much information about this kind of flow. Thereafter, the reality and uniqueness criterion for resemblance solutions of the flow problem was recognized by Miklavcic and Wang [5]. Hayat et.al. [6, 7] have deliberated the effect of MHD second-grade fluid flows analytically. Further, the researchers [8, 9, 10, 11, 12, 13, 14] made a detailed investigation of various flow problems over shrinking sheets. The thin film flows past a stretching/shrinking sheet for second-grade fluids was investigated by Nadeem and Faraz [15]. In the past few years, considerable research [16, 17, 18, 19, 20, 21, 22] has been done to deal with the flows past stretching/shrinking surfaces by way of assuming linear and non-linear stretching/shrinking velocities of the flat sheets. In the above-mentioned research works, the no-slip condition was considered. However, in the case of polymer solutions, foams, emulsions, etc. also reveal slip properties at the boundary, and hence are useful for the coating of heart valves and internal cavities. That is why; several researchers [23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34] investigated the boundary layer flows with slip conditions at the boundary. Where as, for convective heating and Navier's partial slip condition [35], the magnetic effects over nonlinear stretching/shrinking nanomaterial sheets have been analyzed by Uddin et al. [36]. The solution of the coupled stress fluid with slip boundary condition has been obtained by Devakaret al. [37] analytically. Liao [38], in the year 1992, initiated his efforts to apply the concept of homotopy [39] to get analytic values by using nonlinear differential equations. Homotopy is a concept of topology [40]. Thus, Liao [38, 41, 42] could succeed in giving the early form of HAM and then modify the HAM to the optimal homotopy analysis method (OHAM) [43, 44, 45, 46, 47, 48]. The solution which is convergence is obtained in the form of a series and is controlled by one or more parameter(s) in OHAM. Here, the best possible values of the convergence control parameter(s) are investigated by way of minimizing the average residual error. Furthermore, OHAM with optimal convergence-control parameter(s) provides much better approximations as compared to HAM. On account of this reason only, numerous investigations about solutions of strongly nonlinear boundary layer equations have been carried out by several researchers [49, 50, 51, and 52] who used OHAM for their analyses. Though the effects of radioactive heat transfer are having significant applications in high-temperature processes and space technology, the literature related to the study of radiation effects over the boundary layer is very scanty. For the maintenance of the quality of the end product, the effects of thermal radiation are responsible as they play a crucial role in monitoring the energy effects and the end product quality in the polymer processing industry mainly depends on controlling factors of the heat. The numerical analysis of the laminar flow for the electrically conducting incompressible fluid using the exponentially stretched surface was studied by Sharma et.al. [32]. But, neither a numerical nor an analytical study still has been reported for the above-said problem in the presence of MHD. Further, it was surprising to know from the literature that several authors, who had worked on similar problems, did not attempt to investigate the study of injection for the case of flow

even though injection is having significant applications in many non-linear boundary value problems in fluid mechanics. The possibility may be due to the reason that those authors did not get the solutions in case of injection with their numerical approach towards the problem. Fang and Zang[53] and Miklavcic and Wang [5], investigated the solutions in case of injection available for a certain range of the magnetic parameter. However, the studies of Fang and Zang [53] and Miklavcic and Wang [5] are limited to the flows due to linear shrinking without considering the heat transfer and the slip effect. The foremost principle of the current investigation is to attain an analytic solution to the laminar incompressible MHD boundary layer viscous fluid flow problem on the exponentially porous shrinking surface which is electrically conducting with suction/ injection, thermal radiation, velocity and thermal slips. To serve this purpose, one-parameter OHAM has been introduced in the current study.

III. Problem formulation:

Here a 2D flow using a viscous, incompressible, and electrically conducting fluid, on forced convection of a boundary layer has been considered. The flow is steady and is taking place past an exponentially shrinking porous sheet that overlaps with $y = 0$. Flow under consideration was restricted only to $y \geq 0$ plane (Refere Fig. 1). Two opposite and equal forces directed towards an origin are applied along the plane $y = 0$ of the co-ordinate system. On account of this, by keeping the origin fixed, the sheet shrinks. Further, for suction the value of flux-velocity is $V(x) \geq 0$ and $V(x) \leq 0$ for injection. Further, the radiation flux q_r is considered in normal surface direction. $B(x)$ under the application of variable magnetic field on the sheet.

Here governing equations assumed were:

$$\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0 \quad (2.1)$$

$$u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y} = -\frac{uB^2(x)\sigma}{\rho} + \nu \frac{\partial^2 u}{\partial y^2} \quad (2.2)$$

$$u \frac{\partial T}{\partial x} + v \frac{\partial T}{\partial y} = \frac{k}{\rho c_p} \frac{\partial^2 T}{\partial y^2} - \frac{k}{\rho c_p} \frac{\partial q_r}{\partial y} + \frac{q'''}{\rho c_p} \quad (2.3)$$

Here ρ is density-thermal diffusivity; ν is kinematic viscosity; κ is thermal conductivity; c_p is specific heat of fluid under pressure is constant; and T - dimensionless fluid temperature.

In writing the Eq. (2.2), the $B(x)$ has been neglected.

The suitable boundary conditions governing the flow-field are

$$\begin{cases} v = -V(x), u = N_s v \frac{\partial u}{\partial y} + U(x), T_w = T_\infty + T_0 e^{\frac{x}{2L_0}} \text{ at } y = 0 \\ T \rightarrow T_\infty, u \rightarrow 0 \text{ as } y \rightarrow \infty \end{cases} \quad (2.4)$$

Here $U(x) = -U_0 e^{\frac{x}{L_0}}$ shrinking velocity $T_w = T_\infty + T_0 e^{\frac{x}{2L_0}}$ -wall temperature, where L_0 -reference length, U_0 reference velocity and T_0 -reference temperature; $B(x) = B_0 e^{\frac{x}{2L_0}}$ - induced magnetic field, where B_0 is constant. $D = D_1 e^{-\frac{x}{2L_0}}$ - Thermal slip factor, where D_1 is initial thermal slip factor $N_s = N_1 e^{-\frac{x}{2L_0}}$ velocity slip factor, where N_1 initial velocity slip factor; $V(x) = V_0 e^{\frac{x}{2L_0}}$ - a special Velocity considered on a wall, where V_0 -strength of injection/suction velocity initially, and. Also, N_s and D changes with x . Thus, a no-slip condition was retrieved for $N_s = D = 0$.

For q_r , by considering the Rosseland approximation.

$$q_r = -\frac{4\gamma^*}{3\alpha^*} \left(\frac{\partial T^4}{\partial y} \right) \quad (2.5)$$

Here α^* - absorption coefficient α^* - absorption coefficient. Further, difference between T and T_∞ has been considered to be small, one can obtain

$$T^4 \approx 4T_\infty^3 T - 3T_\infty^4 \quad (2.6)$$

by ignoring the second and high order values and T^4 about T_∞ were expanded. The Eq. (2.3), together with (2.5) and (2.6), changes to

$$u \frac{\partial T}{\partial x} + v \frac{\partial T}{\partial y} = \frac{k}{\rho c_p} \left(1 + \frac{4}{3} R \right) \frac{\partial^2 T}{\partial y^2} + \frac{q'''}{\rho c_p} \quad (2.7)$$

where $R = \frac{4\gamma^* T_\infty^3}{k\alpha^*}$ - isothermal radiation

$$q''' = \frac{kU(x)}{2Lv} \left[A^* (T_w - T_\infty) f' + B^* (T - T_\infty) \right]$$

Introducing the following similarity variables (Mukhopadhyay and Gorla)

$$\begin{cases} u = U_0 e^{\frac{x}{2L_0}} f'(\zeta), & v = -\sqrt{\frac{\nu U_0}{2L_0}} e^{\frac{x}{2L_0}} \{f(\zeta) + \zeta f'(\zeta)\}, & \zeta = ye^{\frac{x}{2L_0}} \sqrt{\frac{U_0}{2\nu L_0}} \\ T = T_\infty + T_0 e^{\frac{x}{2L_0}} & \theta(\zeta) = \frac{T - T_\infty}{T_w - T_\infty}, \end{cases} \quad (2.8)$$

For these similarity variables, the continuity Eq. (2.1) will be satisfied identically. The remaining Eqs. (2.2) and (2.7), together with the boundary conditions (2.4), will be reduced to

$$f''' + ff'' - 2f'^2 - Mf' = 0 \quad (2.9)$$

$$\text{Pr}(f\theta' - f'\theta) + (1 + \frac{4}{3}R)\theta'' - (A^* f' + B^* \theta) = 0 \quad (2.10)$$

$$f = s, f' = \lambda, f'' = 1, \theta = \delta, \theta' = 1 \text{ at } \zeta \rightarrow 0 \quad (2.11)$$

$$\theta \rightarrow 0, f' \rightarrow 0 \text{ for } \zeta \rightarrow \infty \quad (2.12)$$

Here, ζ' is the dash signifies derivative, magnetic parameter is $M = \frac{2\sigma B_0^2 L_0}{\rho U_0}$, slip parameter Velocity is $\lambda = N_1 \sqrt{\frac{U_0 \vartheta}{2L_0}}$, $\delta = D_1 \sqrt{\frac{U_0}{2L_0 \vartheta}}$ is thermal slip value, $s = V_0 / \sqrt{\frac{U_0 \vartheta}{2L_0}}$ > 0 (or < 0) –injection (or suction) parameter, and $Pr = \frac{\mu c_p}{k}$ - prandtl number.

HAM Solution:

Here, we exemplify the steps to attain the resolutions of the equivalences (2.9) to (2.10) exposed to the boundary conditions (2.11 to 2.12) by means of HAM. For this determined, we take the preliminary guesses f_0, θ_0 and ϕ_0 of f, θ in the following form:

$$f_0(\xi) = \frac{e^{-\xi} - 1}{\lambda + 1} + s, \quad (3.13)$$

Here $\theta_0(\xi) = \frac{e^{-\xi}}{1 + \delta}, \quad (3.14)$

$$L_f = -f' + f''' \quad (3.15)$$

$$L_\theta = -\theta + \theta'' \quad (3.16)$$

are the auxiliary linear operator which satisfy

$$[c_1 + c_2 \zeta + c_3 e^{-\zeta}] L_f = 0 \quad (3.17)$$

$$[c_4 e^\zeta + c_5 e^{-\zeta}] L_\theta = 0 \quad (3.18)$$

The linear operatives are designated as with the subsequent possessions where

$c_i (i = 1, 2, 3, 4, 5)$ Are the random constants. We paradigm the 0th -order distortion equivalences as:

$$(1-p)L_1(f(\xi;p) - f_0(\xi)) = ph_1N_1[f(\xi;p)], \tag{3.19}$$

$$(1-p)L_2(\theta(\xi;p) - \theta_0(\xi)) = ph_2N_2[f(\xi;p), \theta(\xi;p)] \tag{3.20}$$

Subject to the boundary conditions:

$$f(0;p) = s, \quad f'(0;p) = f''(0;p)\lambda - 1, \quad f(\infty;p) = 0, \tag{3.21}$$

$$\theta(0;p) = \delta\theta'(0;p) + 1, \quad \theta(\infty;p) = 0 \tag{3.22}$$

N_1 and N_2 are non-linear differential operators.

$$N_1[f(\xi;p)] = f(\xi;p) \frac{\partial^2 f(\xi;p)}{\partial \xi^2} - M \frac{\partial f(\xi;p)}{\partial \xi} - 2 \left(\frac{\partial f(\xi;p)}{\partial \xi} \right) + \frac{\partial^3 f(\xi;p)}{\partial \xi^3} \tag{3.23}$$

$$N_2[f(\xi;p), \theta(\xi;p)] = \Pr \left(f(\xi;p) \frac{\partial \theta(\xi;p)}{\partial \xi} - \frac{\partial f(\xi;p)}{\partial \xi} \theta(\xi;p) \right) + \frac{\partial^2 \theta(\xi;p)}{\partial \xi^2} - \left[A^* \frac{\partial f(\xi;p)}{\partial \xi} + B^* \theta(\xi;p) \right] \tag{3.24}$$

Where $p \in [0,1]$ is the implanting constraint, h_1, h_2 are the non-zero supplementary constants. When $p = 0$ and $p = 1$, we attain

$$f(\xi;0) = f_0(\xi), \quad f(\xi;1) = f(\xi) \tag{3.25}$$

$$\theta(\xi;0) = \theta_0(\xi), \quad \theta(\xi;1) = \theta(\xi) \tag{3.26}$$

Thus, as p rises from 0 to 1 then

$f(\xi;p), \theta(\xi;p)$ Differ from preliminary estimates to the exact resolutions of the novel nonlinear variance equivalences.

Now, with the help of Taylor's series expansion, following equation we get

$$f(\xi;p) = f_0(\xi) + \sum_{m=1}^{\infty} f_m(\xi) p^m \tag{3.27}$$

$$f_m(\xi) = \frac{1}{m!} \left. \frac{\partial^m f(\xi;p)}{\partial p^m} \right|_{p=0} \tag{3.28}$$

$$\theta(\xi;p) = \theta_0(\xi) + \sum_{m=1}^{\infty} \theta_m(\xi) p^m \tag{3.29}$$

$$\theta_m(\xi) = \frac{1}{m!} \left. \frac{\partial^m \theta(\xi;p)}{\partial p^m} \right|_{p=0} \tag{3.30}$$

The series convergence (3.27) and (3.29) depends strongly on the h_1 and h_2 , respectively. Further it was assumed h_1 and h_2 chosen so that series (3.27) and (3.29), stands convergent on $p = 1$. By using (3.25) and (3.26), following equations were formed:

$$f(\xi) = f_0(\xi) + \sum_{m=1}^{\infty} f_m(\xi) \quad (3.31)$$

$$\theta(\xi) = \theta_0(\xi) + \sum_{m=1}^{\infty} \theta_m(\xi) \quad (3.32)$$

After differentiating the 0-th order deformation Eqs. (3.19) and (3.20) m times using q and dividing the equations with $m!$ and lastly fixing $p = 0$, one can calculate using m th order deformation equations given below,

$$L_f(f_m(\xi) - x_m f_{m-1}(\xi)) = h_1 R_m^f(\xi) \quad (3.33)$$

$$L_\theta(\theta_m(\xi) - x_m \theta_{m-1}(\xi)) = h_2 R_m^\theta(\xi) \quad (3.34)$$

with the subsequent boundary conditions, we have

$$f'_m(\infty) = -\lambda f''_m(0) + f'_m(0) = f_m(0) = 0, \theta_m(\infty) = -\delta \theta'_m(0) + \theta_m(0) = 0 \quad (3.35),$$

Where

$$R_m^f(\xi) = -M f'_{m-1} + f'''_{m-1} + \sum_{k=0}^{m-1} [f_{m-1-k} f''_k - 2 f'_{m-1-k} f'_k]$$

$$R_m^\theta(\xi) = \left(1 + \frac{4}{3}\right) \theta''_{m-1} + Pr \left(\sum_{k=0}^{m-1} f_{m-1-k} \theta'_k - \theta_{m-1-k} f'_k \right) - [A^* f'_{m-1} + B^* \theta_{m-1}] \quad (3.37)$$

$$x_m = \begin{cases} 0, & m \geq 1, \\ 1, & m < 1. \end{cases} \quad (3.38)$$

Eqs. (3.33)-(3.35)

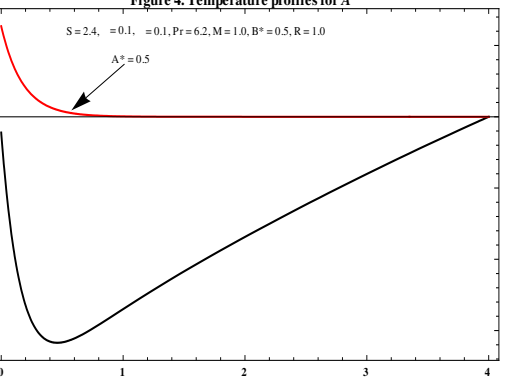
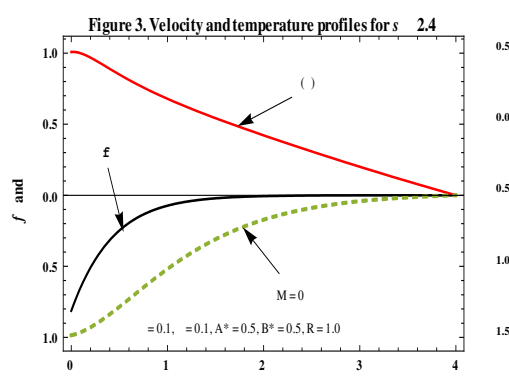
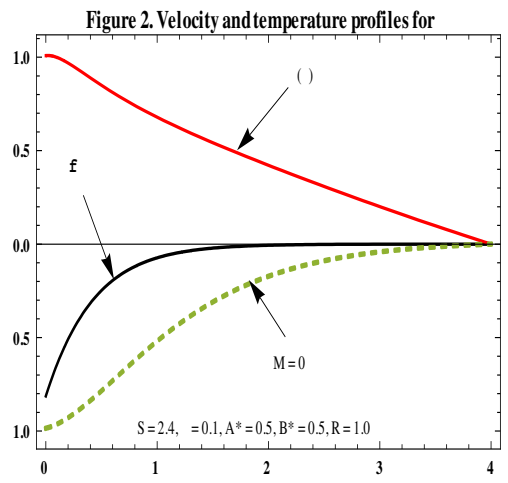
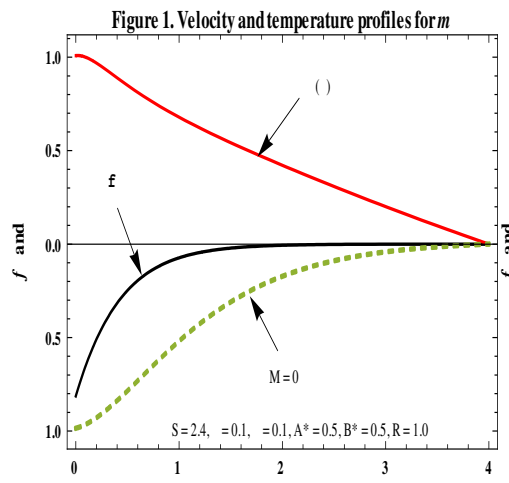
$$f_m(\xi) = c_1 + c_2 \xi + c_3 e^{-\xi} + f^*_m(\xi) \quad (3.39)$$

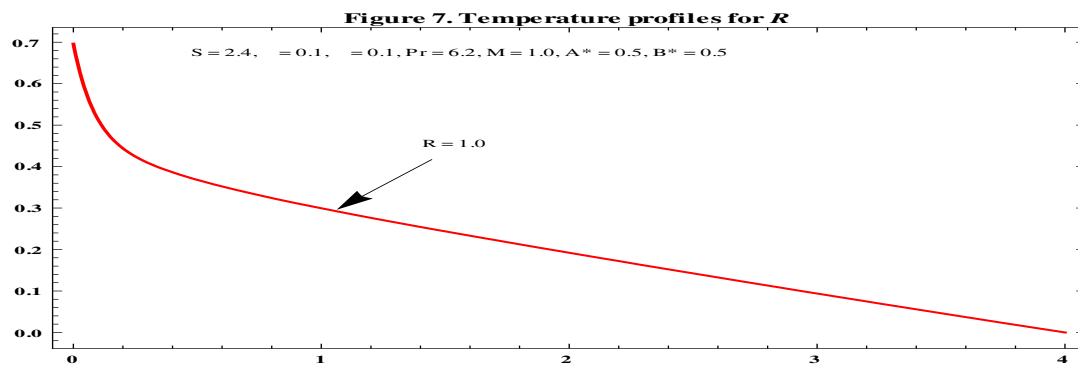
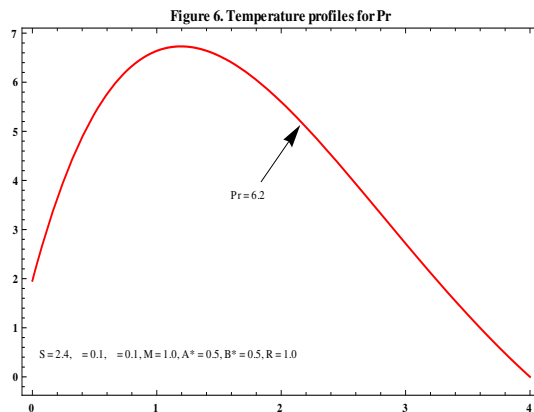
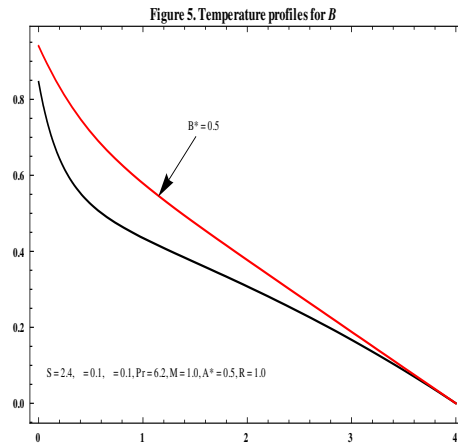
$$\theta_m(\xi) = c_4 e^\xi + c_5 e^{-\xi} \theta^*_m(\xi) \quad (3.40)$$

IV. Result and discussion:

Analytical solution to the governing Eqs. (2.9) and (2.10) with boundary conditions (2.11)-(2.12) has been achieved using OHAM for a variety of values of Different parameters like velocity and thermal slip parameters, magnetic, suction, radiation and Prandtl number. The effect of magnetic parameter M

on the velocity profiles f' and the temperature profiles θ are shown in Figures 1. It is found that a parameter M leads to increasing on velocity, and decreasing temperature profile and the thermal boundary layer thickness. Figures 2 present the effect of the stretching sheet λ on velocity and temperature profiles. It is observed that the velocity increases with increase in stretching sheet λ and decrease in temperature profile. Figures 3 show the effect of the suction parameter S on the velocity and temperature profiles. An increase in suction parameter S leads to increase in velocity and decrease temperature profiles. The graphs in Figure 4-5 are plotted to observe the impacts of A^* , B^* in temperature field. Impact of Prandtl number Pr and thermal radiation on temperature profiles is demonstrated through the plots 6 and 7 respectively. It shows that temperature on a fixed point, decreases the thickness of thermal boundary layer





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Use of ICT in Teaching Electronics to Undergraduates

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I. Introduction:

Information and Communication Technology (ICT) has become an integral part of modern education. With the advancement in technology, it has become possible to use various ICT tools and platforms in teaching and learning. In the field of electronics, ICT has a significant impact on the teaching and learning process. This research paper discusses the use of ICT in teaching electronics and its benefits.

II. Benefits of using ICT in Teaching Electronics:

- The use of ICT in teaching electronics has several benefits for both teachers and students. Firstly, it provides an interactive and engaging learning experience for the students. ICT tools such as simulations, virtual labs, and multimedia resources enable students to understand complex concepts easily. For instance, virtual labs provide a safe and controlled environment for students to conduct experiments without the risk of damaging equipment or harming themselves (Abdullahi, 2021). This method of teaching also enables students to learn at their own pace and in their own time.
- Secondly, the use of ICT in teaching electronics provides teachers with new teaching methods and techniques. This allows teachers to incorporate different teaching styles into their lessons, catering to students' individual learning styles. For instance, teachers can use online forums and discussion boards to encourage students to share their ideas and collaborate with each other (Wang et al., 2021).
- Thirdly, the use of ICT in teaching electronics allows for remote learning. With the COVID-19 pandemic, remote learning has become a necessity for many students. ICT tools such as online classes and virtual meetings have enabled students to continue their education from home. This has also allowed teachers to continue teaching without any interruption (Alade, 2021).
- Fourthly, the use of ICT in teaching electronics provides students with access to a vast array of learning resources. With the internet, students can access online textbooks, journals, and articles

on electronics. This provides them with a broader understanding of the subject and helps them to stay up-to-date with the latest developments in the field (Hussein, 2021).

III. Challenges of using ICT in Teaching Electronics:

- While the use of ICT in teaching electronics has many benefits, it also presents several challenges. Firstly, there is a lack of technical skills among teachers. Many teachers are not proficient in the use of ICT tools, which can hinder their ability to incorporate them into their teaching (Nasiru, 2021).
- Secondly, the use of ICT in teaching electronics requires access to technology and the Internet. In some areas, this may be a challenge due to a lack of infrastructure or inadequate resources (Almusharraf, 2021).
- Thirdly, the use of ICT in teaching electronics can be expensive. The cost of purchasing and maintaining equipment and software can be a significant barrier, especially for schools and institutions with limited budgets (Akinpelu, 2021).

IV. Conclusion:

The use of ICT in teaching electronics has many benefits, including providing an interactive and engaging learning experience, enabling remote learning, and providing access to a vast array of learning resources. However, it also presents challenges such as a lack of technical skills among teachers, access to technology and the internet, and the high cost of equipment and software. Therefore, it is essential to provide teachers with adequate training and support, ensure access to technology and the internet, and develop cost-effective solutions to make ICT tools and platforms more accessible to everyone.

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Handwritten Documents Age identification based LPQ

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I. Abstract:

LPQ (Local Phase Quantization) method employed for document age identification. LPQ techniques on a dataset of 100 handwritten document images written by 100 writers (50 are original and 50 forged). The classification of forged and original documents was performed using a KNN classifier. The average classification accuracy of original and forgery documents is 92.9% and 90.5%, respectively.

Keywords — RT, DWT, LPQ, Forgery Documents, SVM.

II. Introduction:

Why Handwritten Documents analysis?

Most people learn to write by copying letter formations from a copybook at a young age. The ability to reproduce the letter formations varies from one person to the next and is based on each writer's perception of the image and their ability (motor skills) to reproduce that visual perception. The act of handwriting is mastered through practice and repetition. Once this occurs, writers focus on the subject matter rather than the physical act of writing and deviate from the copybook forms, interjecting their characteristics. Handwriting is a complex motor skill that is the combination of sensory, neurological, and physiological impulses. Factors such as visual perception and understanding, comprehension of form, central nervous system pathways, and the anatomy and physiology of the bones and muscles of the hand and arm all combine to produce the desired output.

The new printing technologies are used to produce fake documents such as bank cheques and official documents. Identifying such forged documents is hard for the human eye. Moreover, digital technologies help to improve career prospects, awareness, digital skills, etc. The papers are forged within a period for malicious purposes because software and hardware tools are easily affordable at a

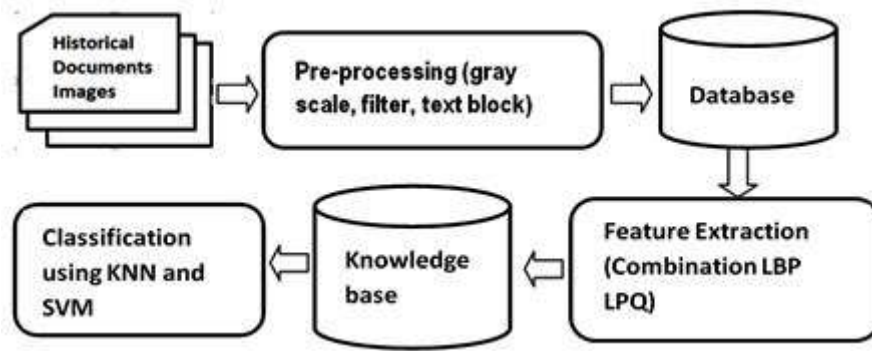
low cost. The forgery documents detected based on a particular page from the documents produced by the sources such as printers, fax machines, scanners, mobiles, etc., can be granted as forgery documents [3]. The forgery document is detected by analyzing the document at the character level. The shape, alignment, or skew of characters are clues for identifying the forgery of documents [4]. The forgery identification of printed copies is highly focused compared to the handwritten forged documents identification. Hence, this paper studied handwritten forged document identification.

III. Proposed method:

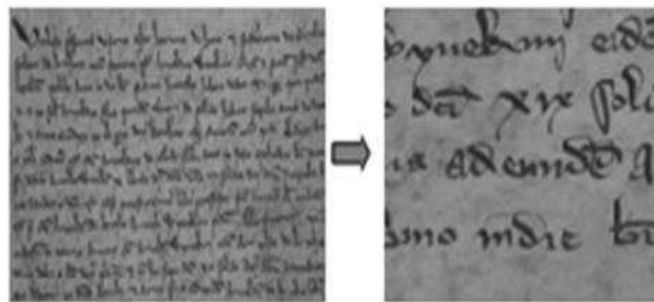
Local Phase Quantization: A texture descriptor is used to compute the texture of the image under study. Image blurring does not affect the LPQ descriptor. The LPQ descriptor uses the local phase spectrum to differentiate the underlying surface by distributing different code words in the image region. This work explores the LPQ descriptor's ability to handle sharp, blurred images. Around each pixel's four frequency points, the local Fourier coefficients $G(x)$ are determined. After that, binary scalar quantization is used to quantify the signs of each coefficient's natural and imaginary parts to acquire phase information for each pixel in the super pixel region. Ultimately, each coefficient's quantization result is encoded as an 8-bit binary string, forming 256 features. Documents are created by writing the same document from the respective four classes: 2 years, 1 ½ year, and one year and six months. These documents are written by using different pens, paper and persons. Figure 2 shows sample document images of a handwritten document. A total of 100 documents images were considered for the experiment. The details of the dataset are shown in Table 1 (this dataset is borrowed from [6]). The original documents are 50 pages, and the forgery documents are 50 pages. It is a two-class problem for the classification of original and forgery documents from their respective classes

Feature Extraction: The extraction of features is an important step, and here extracted the features using DWT based on energy coefficients of Radon transform and LPQ techniques. a) Radon Transform: It is the process of computing the image matrix's projection in a specific direction [14]. The projection of the two-dimensional image of $f(x, y)$ is the line integral of a specific direction. The image's resulting projection is the sum of the pixels' intensities or directional energy in each direction and represents a new image $g(\rho, \theta)$.

The Block diagram is follows:



Sample Handwritten Document Text Block:



The Result of KNN is shown in the following Table:

Age of the Document	6-Months	1-Year	1 ½ - Year	2-Year
Accuracy	98.1%	96.9%	94.4%	91.9%

IV. Conclusion:

This paper concludes by demonstrating the efficacy of blending LPQ to capture the texture’s global and local properties. Experimentally proved that their feature works well on text blocks and whole pages of handwritten documents for age identification.

Concise Introduction to PCA

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I. Introduction:

PCA stands for Principal Component Analysis, and it is a popular technique in machine learning and data science for dimensionality reduction. The purpose of PCA is to reduce the number of variables in a dataset while preserving the most important information. In this tutorial, I will explain the mathematics behind PCA and provide some numerical examples to help illustrate the concept.

What is PCA?

PCA is a statistical technique that transforms a set of correlated variables into a smaller set of uncorrelated variables called principal components. The first principal component explains the largest amount of variability in the original data, the second principal component explains the second largest amount of variability, and so on. The goal of PCA is to find a low-dimensional representation of the data that captures most of the variability in the original data.

II. The Mathematics of PCA:

To perform PCA, we first need to center and scale the data. This means that we subtract the mean from each variable and divide by the standard deviation. This ensures that each variable has a mean of zero and a standard deviation of one. The reason for doing this is to ensure that each variable has equal weight in the PCA calculation.

Let's say we have a dataset with n observations and p variables. We can represent this dataset as an $n \times p$ matrix X , where each row corresponds to an observation and each column corresponds to a variable. To center and scale the data, we first calculate the mean and standard deviation of each variable. Let μ be a vector of length p that contains the means of each variable, and let σ be a vector of length p that contains the standard deviations of each variable. We can then center and scale the data using the following formula:

$$Z = (X - \mu) / \sigma$$

Where Z is an $n \times p$ matrix that contains the centered and scaled data.

Once we have centered and scaled the data, we can calculate the principal components. The first principal component is the linear combination of the variables that explains the largest amount of variability in the data. We can calculate the first principal component as follows:

$$PC1 = w1'Z$$

Where $w1$ is a vector of length p that contains the weights for each variable. The weights are chosen such that the variance of $PC1$ is maximized subject to the constraint that $w1$ has unit length. In other words, we want to find the linear combination of variables that explains the most variability in the data.

To calculate the second principal component, we need to find a linear combination of the variables that explains the most variability subject to the constraint that it is uncorrelated with $PC1$. We can represent this constraint mathematically as follows:

$$w2'Z = 0 \quad w2'w1 = 0 \quad w2'w2 = 1$$

where $w2$ is a vector of length p that contains the weights for each variable in the second principal component, and the second constraint ensures that the second principal component is uncorrelated with the first principal component.

We can continue this process to calculate the remaining principal components. The k th principal component is the linear combination of the variables that explains the k th largest amount of variability subject to the constraint that it is uncorrelated with the previous $k-1$ principal components.

Example:

Let's work through a simple example to illustrate the concept of PCA. Suppose we have a dataset with two variables $x1$ and $x2$, and we want to reduce the dimensionality of the data from two to one using PCA. The data is shown in the following table:

Observation	$x1$	$x2$
1	2	4
2	2	5
3	3	6

To perform PCA on this dataset, we first need to center and scale the data. We can calculate the mean and standard deviation of each variable as follows:

$$\mu = [2.33, 5] \quad \sigma = [0.47, 0.82]$$

where μ and σ are vectors of length 2 that contain the means and standard deviations of x_1 and x_2 , respectively. We can then center and scale the data using the formula:

$$Z = (X - \mu) / \sigma$$

This gives us the following centered and scaled data

Observation	x_1	x_2	z_1	z_2
1	2	4	-1	-0.24
2	2	5	-1	0.82
3	3	6	1	0.41

Next, we can calculate the first principal component. The weights for each variable are chosen such that the variance of PC1 is maximized subject to the constraint that the weights have unit length. We can calculate the weights using the following formula:

$$w_1 = \operatorname{argmax}(w'w = 1) \operatorname{Var}(w'Z)$$

Where $\operatorname{Var}(w'Z)$ is the variance of the linear combination $w'Z$. We can calculate this variance using the formula:

$$\operatorname{Var}(w'Z) = (1/n) * \sum (w'Z)^2$$

Where $\sum (w'Z)^2$ is the sum of the squared values of the linear combination $w'Z$. We can find the weights w_1 that maximize this variance using the method of Lagrange multipliers, which gives us the following equation:

$$Z'Zw_1 = \lambda_1 w_1$$

Where λ_1 is a scalar that ensures that w_1 has unit length. This equation can be solved using eigenvalue decomposition to find the weights w_1 and the corresponding eigenvalue λ_1 . The weights w_1 are given by the eigenvector corresponding to the largest eigenvalue of the matrix $Z'Z$. We can calculate this matrix as follows:

$$Z'Z = \begin{bmatrix} 3 & 1.41 \\ 1.41 & 1 \end{bmatrix}$$

Where $'$ represents a new row. We can then perform eigenvalue decomposition on $Z'Z$ to find the weights w_1 and the corresponding eigenvalue λ_1 . The result is:

$$\lambda_1 = 3.53 \quad w_1 = [0.82; 0.57]$$

Therefore, the first principal component is:

$$PC1 = w1'Z = [0.82 \ -1.04 \ 0.22]$$

Which represents a linear combination of the variables x_1 and x_2 that explains the largest amount of variability in the data.

To calculate the second principal component, we need to find a linear combination of the variables that explains the most variability subject to the constraint that it is uncorrelated with PC1. We can represent this constraint mathematically as follows:

$$w2'Z = 0 \quad w2'w1 = 0 \quad w2'w2 = 1$$

We can solve this equation using the same method as before. The weights w_2 are given by the eigenvector corresponding to the second largest eigenvalue of $Z'Z$. We can calculate this eigenvalue as follows:

$$\lambda_2 = 0.47 \quad w_2 = [-0.57; 0.82]$$

Therefore, the second principal component is:

$$PC2 = w2'Z = [-0.4 \ 0.75 \ -0.35]$$

which represents a linear combination of the variables x_1 and x_2 that explains the second largest amount of variability in the data and is uncorrelated with PC1

Now that we have calculated the first two principal components, we can use them to reduce the dimensionality of the data from two to one. We can do this by projecting the centered and scaled data onto the first principal component. The projection of an observation z onto PC1 is given by:

$$z_1 = w1'z$$

Where z_1 is a scalar that represents the value of the observation on the first principal component. We can calculate the projections for each observation in our dataset as follows:

Observation	z_1
1	-1.02
2	-0.22
3	1.25

These projections represent a lower-dimensional representation of the data that captures most of the variability in the original data. We can see that the first principal component (PC1) explains the

majority of the variability in the data, as the second principal component (PC2) only explains a small amount of additional variability.

III. Conclusion:

In this tutorial, we have seen how to perform PCA using numerical examples and mathematical calculations. PCA is a useful technique for reducing the dimensionality of a dataset while preserving the most important information. By calculating the principal components of the data, we can identify the linear combinations of variables that explain the most variability in the data and use them to project the data onto a lower-dimensional space. This can be useful for visualizing and analyzing high-dimensional datasets, as well as for reducing the computational complexity of machine learning algorithms.

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Comprehensive Review of Educational Technology: Transforming the Learning Landscape

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I. Introduction:

Educational technology has become an essential component in modern education, significantly transforming teaching and learning processes (Bates, 2019). This review article provides an overview of the current state of educational technology, its benefits and challenges, and its future prospects. The article draws on a range of research studies to offer a holistic understanding of the subject.

II. Benefits of Educational Technology:

1. Enhanced Learning Experiences:

Educational technology improves learning experiences by providing multimedia-rich content, engaging learners through interactive platforms, and offering personalized learning opportunities (Zheng & Newgarden, 2022). For example, Mayer's (2014) Cognitive Theory of Multimedia Learning posits that multimedia instruction enhances learning by helping learners integrate visual and auditory information.

2. Improved Accessibility:

Online learning platforms enable students to access educational resources regardless of their geographic location or time constraints (Pulham & Graham, 2018). This democratization of education has particularly benefited students in remote areas and non-traditional learners (Moore & Kearsley, 2012).

3. Collaboration and Networking:

Educational technology fosters collaboration and networking among learners, enabling them to share knowledge and ideas in virtual environments (Alonso et al., 2021). Tools such as Google Workspace for Education and Microsoft Teams facilitate communication and teamwork among students and educators (Dabbagh & Kitsantas, 2012).

III. Challenges in Educational Technology:

1. Digital Divide:

Despite the growing adoption of technology in education, the digital divide remains a significant concern (Warschauer & Matuchniak, 2010). Access to technology is often limited for students from low-income households and those residing in rural areas, exacerbating existing educational inequalities (Selwyn, 2016).

2. Privacy and Security:

The increasing use of technology in education raises concerns regarding privacy and security (Sclater, 2017). Schools and educators must ensure that students' personal information is protected and that online learning environments are secure from threats such as hacking and cyberbullying (Prinsloo & Slade, 2017).

3. Teacher Training and Competence:

The successful integration of technology in education depends on teachers' ability to effectively use and implement these tools (Tondeur et al., 2017). Teacher training and ongoing professional development are essential to bridge the gap between technology adoption and effective classroom practice (Ertmer & Ottenbreit-Leftwich, 2010).

IV. Future Prospects:

The future of educational technology lies in emerging technologies such as artificial intelligence, virtual reality, and learning analytics (Sharples et al., 2016). These innovations have the potential to further enhance learning experiences, promote personalized instruction, and optimize educational outcomes (Weller, 2021).

V. Conclusion:

Educational technology has transformed the educational landscape, providing numerous benefits such as enhanced learning experiences, improved accessibility, and increased collaboration. However, challenges such as the digital divide, privacy concerns, and teacher training persist. By addressing

these challenges and embracing emerging technologies, educational technology will continue to revolutionize learning in the years to come.

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A Simple and Concise Tutorial on K-Nearest Neighbor Classifier

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I. Introduction:

K-Nearest Neighbors (KNN) is a machine learning algorithm used for classification and regression tasks. The algorithm is based on finding the k closest training examples in the feature space to a new test example and making predictions based on the majority class or average value of the k nearest neighbors.

II. KNN Algorithm:

The KNN algorithm can be summarized in the following steps:

- Calculate the distance between the test example and all training examples in the feature space using a distance metric such as Euclidean distance or Manhattan distance.
- Select the k nearest neighbors based on the calculated distances.
- For classification tasks, predict the majority class among the k nearest neighbors. For regression tasks, predict the average value of the k nearest neighbors.

III. Advantages and Disadvantages:

The KNN algorithm has several advantages and disadvantages:

Advantages:

- Simple to understand and implement.
- Non-parametric, meaning it doesn't make any assumptions about the underlying distribution of the data.
- Can be used for both classification and regression tasks.

Disadvantages:

- Computationally expensive for large datasets, as it requires calculating the distance between each test example and all training examples.
- Sensitive to the choice of distance metric and k value.
- Requires a large amount of memory to store all training examples.
- Suppose we have a dataset of houses with two features: square footage and number of bedrooms, and we want to predict the selling price of a new house based on these features. The dataset looks like this:

Square Footage (in sqft)	Number of Bedrooms	Selling Price (in thousands)
1500	3	350
2000	4	480
1200	2	250
1800	3	375
1000	2	200

Suppose we want to predict the selling price of a new house with square footage of 1700 sqft and 3 bedrooms. We can use the KNN algorithm to find the k closest houses in the feature space to the new house and make a prediction based on their selling prices.

Let's choose $k=3$. First, we need to calculate the distance between the new house and each of the houses in the dataset using a distance metric such as Euclidean distance:

Square Footage (in sqft)	Number of Bedrooms	Selling Price (in thousands)	Distance to New House
1500	3	350	200
2000	4	480	400
1200	2	250	500
1800	3	375	100
1000	2	200	700

Next, we select the 3 houses with the smallest distances to the new house:

Square Footage (in sqft)	Number of Bedrooms	Selling Price (in thousands)	Distance to New House
1500	3	350	200
1800	3	375	100
2000	4	480	400

Finally, we make a prediction for the selling price of the new house based on the selling prices of the 3 nearest neighbors. In this case, the majority class would be the class with the highest frequency, which is \$375,000, since two out of the three nearest neighbors have selling prices of \$375,000. Therefore, we predict that the selling price of the new house with square footage of 1700 sqft and 3 bedrooms would be \$375,000.

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MELTING AND VISCOUS DISSIPATION EFFECT ON UPPER CONVECTED MAXWELL AND JEFFERY NANOFUID

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I. Abstract:

In this research work, we have examined the melting and viscous dissipation effect on upper convected Maxwell and Jeffery nanofluid. Using similarity transformation the governing partial differential equations are reduced into the non-linear ordinary differential equation. The effects of thermal radiation parameter M , Prandtl number Pr , Brownian motion parameter Nb , thermophoresis parameter Nt , Lewis number Le , chemical reaction parameter K , Eckert number Ec , and Jeffery fluid have been discussed graphically in detail with their effect on liquid film flow.

Keywords: UCM fluid Prandtl number, thermal radiation parameter, UCM, Jeffery fluid.

II. Nomenclature:

b	stretching rate[s^{-1}]
x	horizontal coordinate[m]
y	vertical coordinate[m]
u	horizontal velocity component ms^{-1}
v	vertical velocity component ms^{-1}
T	temperature[K]
t	time[s]
C_p	specific heat $J\ kg^{-1}\ K^{-1}$
f	dimensionless streamfunction
Nu_x	local Nusselt number
Ec	Eckert number

C_f	skin friction coefficient
C_∞	ambient concentration
D	permeability parameter
D_B	Brownian diffusion coefficient
D_T	thermophoresis diffusion coefficient
K	thermal conductivity
Le	Lewis number
M	magnetic parameter
Nb	Brownian motion parameter
Nt	thermophoresis parameter
Nu_x	local Nusselt number
Pr	Prandtl number
K	chemical reaction parameter
Q	dimensionless melting parameter
R	thermal radiation parameter
Re_x	local Reynolds number
T	temperature of the fluid
Sh_x	local Sherwood number

III. Introduction:

The study of non-Newtonian fluids gained interest because of their numerous technological applications including the manufacturing of plastic sheets, the performance of lubricants and the movement of biological fluid. In particular, the boundary layer flow of an incompressible non-Newtonian fluid over a stretching sheet has several industrial applications, for example, extraction of a polymer sheet from a dye, drawing of plastic films, oil recovery food processing and paper making. Because of their difference from Newtonian fluids, several models of non-Newtonian fluids have been proposed. Among these, the simplest and the most common model is a Jeffery fluid. Nanofluids are made of nanoparticles (<100nm) suspended in a base fluid such as water, oil and ethylene glycol. There exists a nanolayer that acts as a thermal bridge between solid nanoparticles and base fluid [11] which plays a significant role in heat transfer. It can be used as a coolant in industries resulting in energy savings. Ahmadreza [12] observed that due to their higher thermal conductivity nanofluids are used as liquid cooling of computer processors, solar water heating chillers, domestic refrigerator chillers, nuclear reactor coolant in grinding, nuclear reactor coolants, engine cooling /vehicle thermal management, silicon mirror cooling, electronic cooling, transformer cooling, defence, ships and space technology, power generation in a nuclear reactor. Nanofluids have several heat transfer applications such as car engine heat combustion, drilling, lubrication, microelectronic fuel cell, power exchanger,

diesel electronic circuits, pharmaceutical processes, and process of soil remediation, oil recovery and detergency. Nanofluids enhance the efficiency of large-scale heat exchangers used in chemical processing plants, and smaller-scale heat exchangers used in automotive. The boundary layer flow over a moving horizontal sheet was first initiated by Sakids [10] who developed the flow field due to the flat surface. Sarpakaya [1] was the first researcher to study the MHD flow of non-Newtonian fluid. Prandtl's boundary layer theory proved to be of great use in Newtonian fluids as Navier-Stokes equations can be converted into a much-simplified boundary layer equation which is easier to handle. Crane [2] was the first among others to consider the steady two-dimensional flow of a Newtonian fluid driven by a stretching elastic flat sheet that moves in its plane with a velocity varying linearly with the distance from a fixed point. Subsequently, various aspects of the flow and/or heat transfer problems for stretching surfaces moving in the finite fluid medium have been explored in many investigations, e.g. Refs. [3–9]. The most common and simplest model of non-Newtonian fluids is Jeffrey fluid which has a time derivative instead of convected derivative. I. S. Awaludin et al. [13] studied the Stability analysis of stagnation-point flow over a stretching/shrinking sheet. Maria Imtiaz et al. [14] reported the MHD Convective Flow of Jeffrey Fluid Due to a Curved Stretching Surface with Homogeneous-Heterogeneous Reactions. N. Sandeep and C. Sulochana [15] examined the Momentum and heat transfer behaviour of Jeffrey, Maxwell and Oldroyd-B nanofluids past a stretching surface with a non-uniform heat source/sink. Kartini Ahmad et al. [16] studied Mixed convection Jeffrey fluid flow over an exponentially stretching sheet with a magnetohydrodynamic effect. Tasawar Hayat et al. [17] discussed the MHD stagnation point flow of Jeffrey fluid by a radially stretching surface with viscous dissipation and Joule heating. Kalidas Das et al. [18] reported the Radiative flow of MHD Jeffrey fluid past a stretching sheet with surface slip and melting heat transfer. Hayat T et al. [19] examined Thermal and Concentration Stratifications Effects in the Radiative Flow of Jeffrey Fluid over a Stretching Sheet. Wubshet Ibrahim and mekonnen Negera [20] studied the melting and viscous dissipation effect on upper-convected Maxwell and Williamson nanofluid. M.Eawara Rao and S. Sreenath reported [21] the MHD boundary layer flow of Jeffery fluid over a stretching\shirinking sheet through the porous medium. M. Subhas Abel and Jagadish V. Tawade [22] reported the MHD flow and heat transfer for the upper-convicted Maxwell fluid over a stretching Sheet

IV. Mathematical Formulation:

We consider an incompressible flow of an upper-convected Maxwell and Jeffery nanofluid with chemical reaction and viscous dissipation effect past a stretching surface embedded in porous medium. The study considered uniform stretching velocity u_w and the uniform free stream velocity u_e .

The melting surface of wall subject to fixed temperature T_m and free stream condition T_∞ with $T_\infty > T_m$ is considered.

$$\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0 \quad (1)$$

$$u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y} = v \frac{\partial^2 u}{\partial y^2} + \frac{v}{(1+\lambda_1)} \frac{\partial^2 u}{\partial y^2} - \xi \left(u^2 \frac{\partial^2 u}{\partial x^2} + v^2 \frac{\partial^2 u}{\partial y^2} + 2uv \frac{\partial^2 u}{\partial x \partial y} \right) + U_e \frac{\partial u_e}{\partial x} - \frac{\sigma B^2}{\rho_f} \left(\xi v \frac{\partial u}{\partial y} + u \right) - \frac{v}{k'} u \quad (2)$$

$$u \frac{\partial T}{\partial x} + v \frac{\partial T}{\partial y} = \alpha_m \frac{\partial^2 T}{\partial y^2} + \tau \left\{ D_B \frac{\partial C}{\partial y} \frac{\partial T}{\partial y} + \frac{D_\tau}{T_\infty} \left(\frac{\partial T}{\partial y} \right)^2 \right\} - \frac{1}{(\rho c_p)_f} \frac{\partial q_r}{\partial y} + \frac{v}{\rho_f} \left(\frac{\partial u}{\partial y} \right)^2 \quad (3)$$

$$u \frac{\partial C}{\partial x} + v \frac{\partial C}{\partial y} = D_B \frac{\partial^2 C}{\partial y^2} + \frac{D_\tau}{T_\infty} \frac{\partial^2 T}{\partial y^2} - k_r (C - C_\infty) \quad (4)$$

Where u and v are the velocity components of fluid in x and y respectively, T is temperature, ρ is the density of the practical, ρ_f is the density of the base fluid, $\alpha_m = \frac{k}{\rho c_p}$ thermal diffusivity, ξ is the relaxation time parameter of the fluid, B is the strength of the magnetic field, ν is the kinematic viscosity of the fluid, k is the thermal conductivity of the fluid, D_B is the Brownian diffusion coefficient, D_τ is the thermophoretic diffusion coefficient, $\tau = \frac{(\rho c)_p}{(\rho c)_f}$ the ratio between the effective heat capacity of the nano particle material and heat capacity of the fluid, c is the volumetric volume expansion coefficient, k' is the permeability of porous medium, σ is the electrical conductivity, λ_1 Is dimensionless Jeffery fluid.

σ^* is the Stefan-Boltzman constant, k^* is the absorption constant then we can write for the radiation using Rosseland approximation

$$q_r = \frac{4\sigma^* \partial T^4}{3k^* \partial y}$$

Assuming the temperature difference within the flow such that T^4 may be expanded in a Taylor series about T_∞ and neglecting higher orders we get $T^4 = 4TT_\infty^3 - 3T_\infty^4$

Then,
$$\frac{\partial q_r}{\partial y} = -\frac{16\sigma^* T_\infty^3}{3k^*} \frac{\partial^2 T}{\partial y^2}$$

With an boundary condition

$$u = u_w = ax, T = T_m, C = C_w \text{ at } y = 0, \quad (5)$$

$$u \rightarrow 0, T \rightarrow T_\infty, C \rightarrow C_\infty \text{ as } y \rightarrow \infty, \text{ and } k \left(\frac{\partial u}{\partial y} \right)_{y=0} = \rho [\varphi + c_s (T_m - T_\infty)] \nu(x, 0) \quad (6)$$

The following transformation are introduced

$$\psi = \sqrt{bv}xf(\eta), \theta(\eta) = \frac{(T - T_\infty)}{(T_w - T_\infty)}, \quad \varphi(\eta) = \frac{(C - C_\infty)}{(C_w - C_\infty)}, \quad \eta = \sqrt{\frac{b}{v}}y \quad (7)$$

We choose the stream function $\psi(x, y)$ such that

$$u = \frac{\partial\psi}{\partial y} = bx f'(\eta) \text{ and } v = -\frac{\partial\psi}{\partial x} = \sqrt{bx} f(\eta) \quad (8)$$

Where prime denotes the differentiation with respective η

Method of Solution:

The mathematical problem defined through equation (1) to (4) are transformed the following the boundary problem as

$$f''' + \frac{1}{(1+\lambda_1)} f'' + (\beta M + 1) f f'' - (f')^2 + \beta(2f f' f'' - f^2 f'' - (M + \lambda_2) f') = 0 \quad (9)$$

$$\left(1 + \frac{4}{3} R\right) \theta'' + Pr(f\theta' + Nb\varphi'\theta' + Nt(\theta')^2 + Ec(f'')^2) = 0 \quad (10)$$

$$\varphi'' + Le f \varphi' + \frac{Nt}{Nb} \theta'' - Le \varphi = 0 \quad (11)$$

Where f' is dimensionless velocity, θ is dimensionless temperature, φ is dimensionless concentration,, $d = \frac{v}{k'b}$ is permeability parameter, $\beta = \xi b$ Deborah number, $M = \frac{4\sigma^*}{kk^*}$ is thermal radiation parameter, $k = \alpha_m(\rho c)_f$ is thermal conductivity, $Pr = \frac{v}{\alpha_m}$ is Prandtl number, $Nb = \frac{D_B \tau (C_w - C_\infty)}{v}$ is Brownian motion parameter, $Nt = \frac{\tau D_\tau (T_w - T_\infty)}{T_\infty v}$ is thermophoresis parameter, $Le = \frac{v}{\alpha_m}$ is Lewis number, $K = \frac{k_r}{b}$ is chemical reaction parameter, $Ec = \frac{u_w^2}{c_p(T_\infty - T_m)}$ is Eckert number, $Q = \frac{c_f(T_\infty - T_m)}{\varphi + c_s(T_m - T_0)}$ dimensionless melting parameter.

With corresponding boundary conditions

$$f'(\eta) = 1, Q\theta'(\eta) + Pr f(\eta) = 0, \theta(\eta) = 0, \varphi(\eta) = 0, \text{ at } \eta = 0, \quad (12)$$

$$f(\eta) \rightarrow 0, \theta(\eta) \rightarrow 1, \varphi(\eta) \rightarrow 1, \text{ as } \eta \rightarrow \infty.$$

Result and Discussion:

The objective of the present paper is to study the MHD boundary layer flow of Jeffrey fluid over

stretching/shrinking sheet through a porous medium. The analytical solution is performed for different values of dimensionless parameter involved in the equations such as the Jeffrey parameter λ_1 , Magnetic parameter M , suction/injection

Parameter S . To illustrate the computed results, some figures are plotted and physical explanations are given.

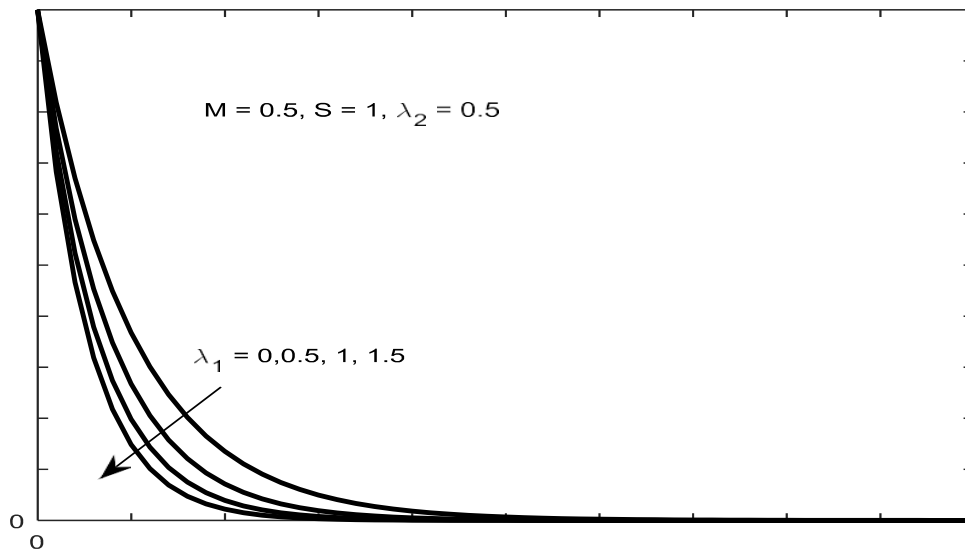


Fig1. The velocity profiles for different values of Jeffrey parameter λ_1 with suction

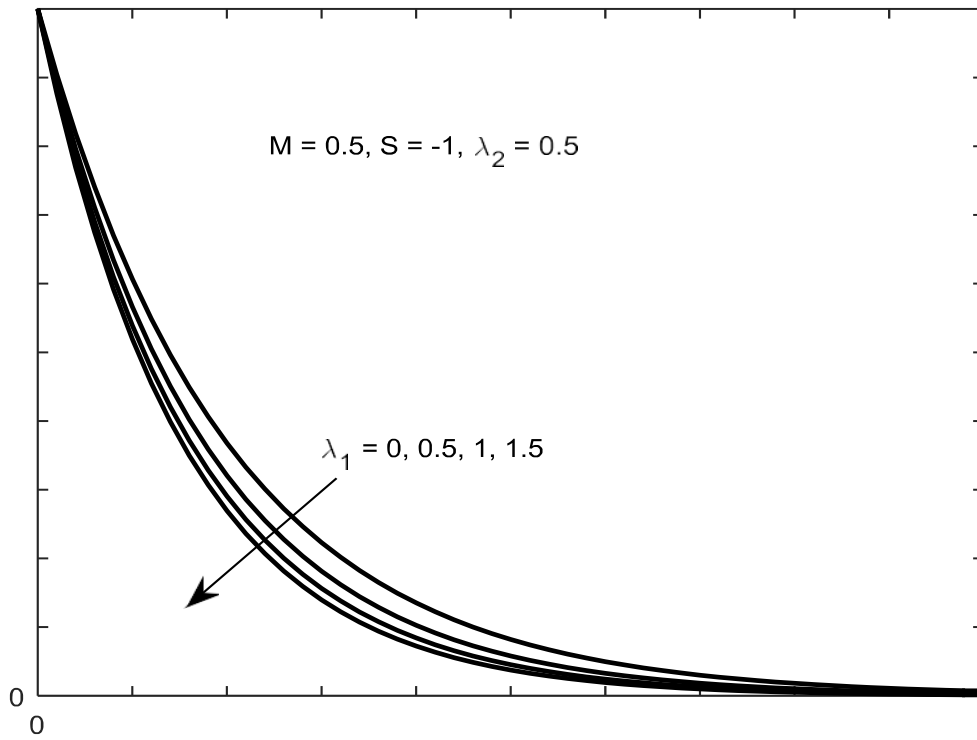


Fig2. The velocity profiles for different values of Jeffrey parameter λ_1 with injection

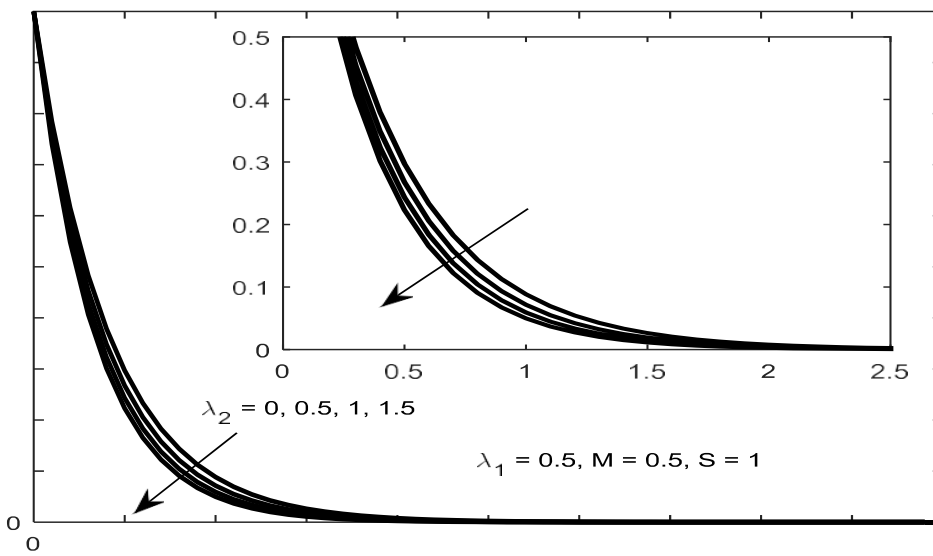


Fig3 The velocity profiles for different values of porous parameter λ_2 with suction

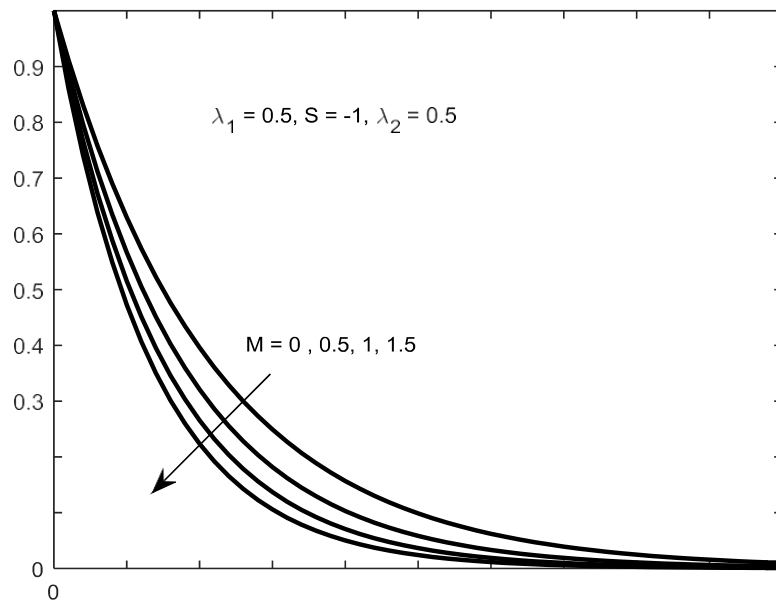


Fig 4.The velocity profiles for different values ofMagnetic parameterM with injection

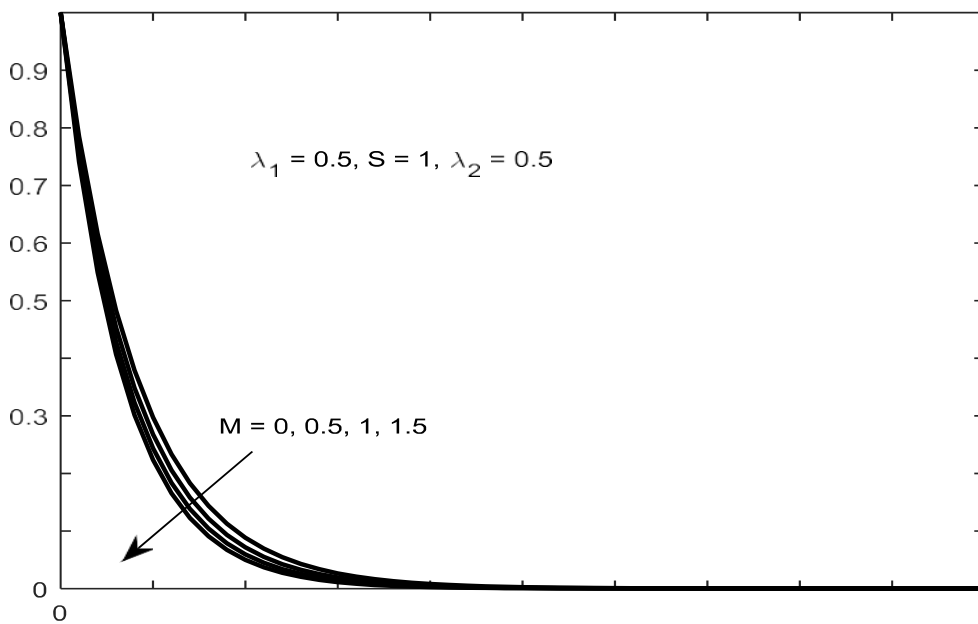


Fig 5.The velocity profiles for different values ofMagnetic parameterM withsuction

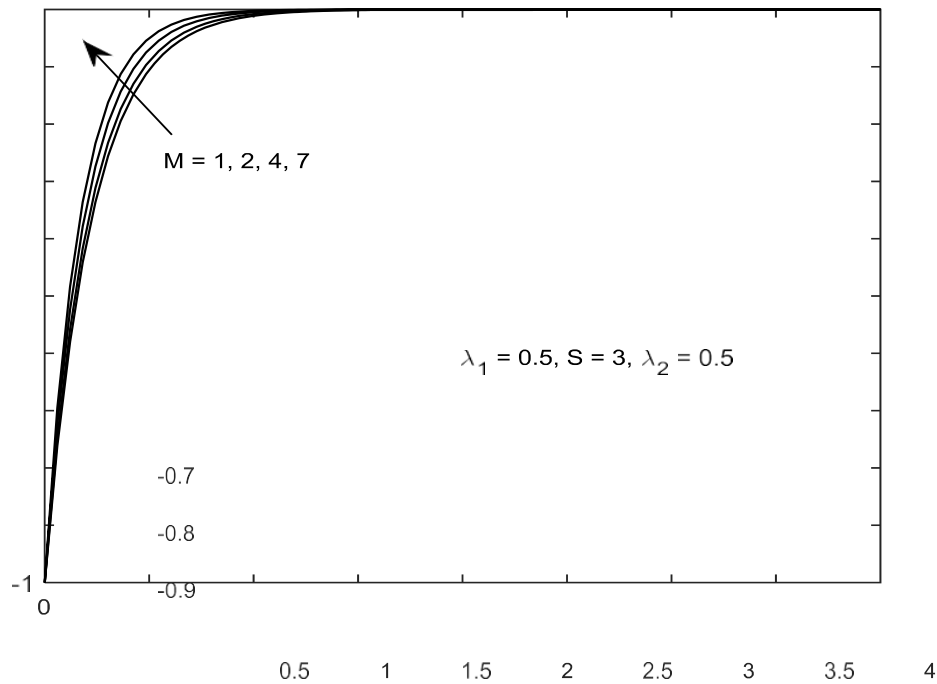


Fig 6. Velocity profiles for different values of Magnetic parameter M

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Study on Importance of Pig rearing in Bidar Taluka

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I. Abstract:

Pig farming or hog farming is the raising and breeding of domestic pigs as livestock, and is a branch of animal husbandry. Pigs convert inedible feeds, forages, certain grain by products obtained from mills, meat by products, damaged feeds and garbage into valuable nutritious meat. Most of these feeds are either not edible or not very Palatable to human beings Pig growth rate is faster than other animals and they are prolific breeders and produce 10 to 14 piglets in a single birth. Pigs also have a high resistance to diseases (these guys hardly get sick) and adapt easily to most environments (hot or cold). Pig manure is a great and widely used fertilizer. You can use this manure for both crop production and in pond for fish farming purpose Commercial pig farming can be a great business idea and income source for the people and it can contribute the national income of our country.

Key words: Smallholder pig farms, shelter management, piglet production, food security, Bidar, Karnataka India.

II. Introduction:

Pig farming is the raising and breeding of domestic pigs as livestock and it is a branch of animal husbandry .Pig farming is also known as piggery or Hog farming. General Characteristic of Pigs: A pig is highly social and intelligent animal. Juvenile pigs are known piglets. Pigs are biologically similar to humans and are thus frequently used for human medical research. Pigs are omnivorous which means that they consume both plants and animal. Older pigs will consume three to five gallons of water per day. Pig communicates with olfactory, virtual and acoustic signal. Like dogs and cats, pigs are polytocous, bearing multiple offspring at the same time. In cold weather, pigs may reduce their foraging activity to conserve energy. Pig farming requires small initial investment for building a pig pen and equipment for maintenance and cleaning etc. The decreasing percentage of pork is 65-80% which directly determines the meat yield of pig farming. This is the way higher in comparison to other commonly breed livestock like poultry, lamb and buffalo whose dressing percentage never exceed 60% .Another Significance application of pig farming is a production of pig manure which is

the excellent manure that can be used in the agricultural, fish pond for fish farming and pond fertilizer.

Study of pig farming in Bidar taluka:

Term Used	Meaning
Sow	Female Adult Pig
Boar	Male Adult Pig
Farrow/ Piglet	Baby Pig
Breeding Stock	Boar & Sow Combination for breeding
Furrowing	Reproduction of sows (giving birth)
Fattener Pig	Pigs reared for slaughter/ sale

Scientific classification of Pig:

Kingdom:	Animalia
Phylum:	Chordata
Class:	Mammalia
Order:	Artiodactyla
Family	Suidae
Subfamily:	Suinae
Genus:	<i>Sus</i> Linnaeus, 1758

❖ Global Overview:

There were about 677.6 million pigs worldwide as of January 2020, meaning that China was home to more than half of the global pig population and as of April 2021, China was home to the largest number of pigs of any country with 406 million heads. That

year, the European Union and United States were second and third in the list, with over 150 and 77 million heads respectively.

❖ National Overview:

The total livestock population consisting of Cattle, Buffalo, Sheep, Goat, Pig, Horses & Ponies, Mules, Donkeys, Camels, Mithun and Yak in the country is 512.05 million numbers in 2012. The total livestock population has decreased by about 3.33% over the previous census.

ALL INDIA LIVESTOCK CENSUS (in thousands)			
	2007	2012	% Change
Pigs			
Exotic/Crossbred			
- Male	1,209	1,283	6.12
- Female	1,180	1,174	-0.51
Total Exotic/Crossbred	2,389	2,457	2.80
Indigenous			
- Male	4,134	3,681	-10.96
- Female	4,610	4,156	-9.85
Total Indigenous	8,744	7,837	-10.37
Total Pigs	11,133	10,294	-7.54

❖ State Overview:

In Karnataka also pig husbandry is profitable occupation for a small and marginal to farmers.

- In Karnataka region have more demand of pork.
- Some pig farm in Karnataka are:

1. Halannavar piggery farm, Belgavi
2. Shrisai pig farm Tigadi Gomar, Karnataka
3. Nisarga pig farm Kengeri, Bangalore
4. Lakshmikantha pig farm Kengeri, Bangalore
5. S.L.V pig farm, Bangalore

❖ Local Level:

In Bidar:

- Pig Husbandry was started at small scale, in several areas around Bidar.
- We have visited to three Pig farms:
 1. Goonalli near veerabhadreshwar Temple, Bidar.
 2. Malkapur, Narsimha Jharna outer Ring road, Bidar.
 3. Papnash near Basavagiri road, Bidar.

2. Material & methods:

- DSLR Camera
- Mobile Phones
- Books & Pens
- Survey Method.
- Observation Method.
- Lecture Method.
- Project Method

Study sites:

1. Goonalli near veerabhadreshwar temple, Bidar
2. Malkapur, Narsimha jharna outer ring road, Bidar
3. Papnash near basavagiri road, Bidar

Feeding & housing arrangement for pig:

Selection of productive breed:

1. There are numerous pig breeds available in the market.
2. We need to select a proper breed that is highly productive.
3. For commercial usage, imported and highly meat productive pig breeds can be chosen. These are available in our country which is given below
 - a. Large White Yorkshire
 - b. Landrace
 - c. Hampshire.

Care & management:

1. Proper care should be taken to keep them free from all types of health hazards and diseases.
2. All the piglets of male need not necessarily for breeding purpose. Some can be kept for breeding and some for castrated at the age of 3 to 4 weeks.
3. Extra care should be taken for sow during the lactation period and fed with nutritious food. Proper care can be taken for breeding boar, piglets and pregnant sows.
4. To prevent swine fever, they can be vaccinated at the age of 2 to 4 weeks.
5. The calm and quiet environment can be provided for the healthy maintenance of the farm and visitors can be avoided.

Care and Management of Piglets:**1. Removal of needle teeth:**

Piglets are born with four pairs of sharp teeth, with two pairs on each jaw. They are of no practical value to the piglets and they may irritate the sow's udder during nursing or cause injury to other piglets. Clipping of these teeth shortly after birth will prevent the injury of the udder caused by the needle teeth.

2. Anemia in piglets:

Anemia is a common nutritional disease in piglets. This condition can be prevented and cured by supplying iron either orally or by injection. Oral administration consists of spraying or swabbing the sow's udder with a saturated solution of ferrous sulphate (0.5 kg of ferrous sulphate in 10 liters of hot

water). This solution must be applied daily from birth until the piglets start eating creep feed. Intramuscular injection of iron–dextran compounds is the more effective method of preventing anemia.

Diseases and control:

- Some common pig diseases are piglet anemia, Swine brucellosis, piglet scours and Leptospirosis. These can be controlled by Vaccinations and antibiotics (I W F)
- Porcine sarcoptic mange: Symptoms include itching, dermatitis, rubbing, scratching and reduced growth rate.
- Treatment: Mitiscidal sprays, Injection and in-feed premix. Breeder's pigs and weaners have treated strategically.
- Gastric Ulcers: Lost of appetite, Vomiting depraved appetite, blood in dung, sudden death, Antibiotics we feed investigate feed, fineness, crude fiber and vitamin E/selenium, reduce stress.
- Intestinal torsion: Sudden death Diet manipulation.

Marketing:

As pig meat has a domestic demand, marketing has become an easier process in commercial pig farming in India. As the demand increase, one can easily sell the products not only in the nearest markets but also target the global market. Pig farming has become profitable business in India and the social scenario has been changed greatly.

Profits of Pig farming:

Pig farming is good and profitable business as the animal is prolific i.e. pig is a fast growing animal. A female pig gives birth to 10 piglets in a span of 4 months i.e. in a year 20 piglets are born by one female pig. The piglets are sold at the age of 6 months and the price for one piglet is 5 thousand. So per annum one can earn 1 lakhs of rupees and 10 thousand rupees per month from just one piglet.

Survey result of pig farming in bidartaluka:

Survey has been done on the entire taluka to determine the population distribution & foraging range of the pigs in pig farming. During the survey in reach of pig population we came across from different locations of pig occurrence in pig farming & most important sites are randomly distributed. Most of the observed sites are in rural and remote areas. On the basis of important survey & site observations, the pig population and farming are based on area and farming facilities such as housing, watering

&feeding, medical facilities. We have visited to 3 sites of pig farming and the population of pigs varies from site to site as follows.

First Site: Goonalli near veerabhadreshwar Temple, Bidar

In Goonalli, moderate pig population was observed in comparison to other sites, because it has limited area of pig farms and modest breeding facilities.

- No. of male (Boar) → 01
- No. of Female (Sow) → 23
- No. of Piglets → 13
- Total no. of Pigs → 37

Second Site: Malkapur, Narsimha Jharna outer Ring road, Bidar

In Malkapur, highest pig population was observed because it has large area of pig farms and best farming facilities.

- No. of male (Boar) → 08
- No. of Female (Sow) → 41
- No. of Piglets → 14
- Total no. of Pigs → 63

Third Site: Papnash near Basavagiri road, Bidar

In Papnash, lowest pig population was observed in comparison to other sites, since the pig farm area is small & under development, and lacks basic farming facilities like housing, water & feeding, veterinary access and breeding.

- No. of male (Boar) → 02
- No. of Female (Sow) → 16
- No. of Piglets → 16
- Total no. of Pigs → 34

After the entire survey, the highest pig population was observed in Malkapur, Narsimha Jharna outer Ring road, Bidar since it has large area of pig farms and best farming facility such as housing, water & feeding, veterinary access, marketing and breeding.

III. Scope of the study:

The scope of this project is to study the various structures & functions of pig farming, to collect and analysis the information related to pig farming. In addition to above, these projects also study the important aspects such as quality, quantity and varieties in pig farming. The pig population of the

country is 11.1 million as per the 2012-13 annual report of Animal Husbandry. Pork production in India is limited, representing only 7% of the country's animal protein sources. Production is concentrated mainly in the northeastern corner of the country and consists primarily of backyard and informal sector producers. According to MoFPI, there are 3600 slaughter houses in India, although the majority of these facilities do not export. There are a small number of abattoirs in India which meet international standards. However, these facilities do not process pork. The study also emphasis on the planning, execution and regulations used by farmers in pig farming. The pig farming constitutes the livelihood of rural poor belonging to the lowest socio-economic strata and they have no means to undertake scientific pig farming with improved foundation stock, proper housing, feeding and management. Therefore suitable schemes to popularize the scientific pig breeding cum rearing of meat producing animals with adequate financial provisions are necessary to modernize the Indian pig industry and to improve the productivity of small sized rural pig farms. The study also look in-depth, the role of Pig farming in increasing the economic growth at rural and national level. In view of these contributions, Government of India has initiated measures to promote the pig farming on scientific lines under its five year plans. In order to make available good foundation stock 115 pig breeding farms were established throughout the country.

IV. Conclusion:

Pig production is a recently introduced activity in Bidar with traditional management. Accordingly, there has been a rise in the production of animal products, particularly from poultry and pigs in the world. With the increase in worldwide demand for meat, fast-growing species with efficient feed conversion rates such as pigs are likely to account for a major share in the growth in the livestock subsector. Pig farming is an important task which provides opportunity as an income generating activity for small-scale farmers, especially in developing countries. In most cases, the reasons for keeping pigs include provision of protein/meat, and manure for fertilizing the soil, particularly for farmers that practice mixed farming. However, there are no substantial information about purpose of pig production, management of pigs, and constraints of these pig producers in the study area. Acquiring these information will help as baseline data for future research and development interventions of pig subsector. Hence, the objectives of this assessment were to examine the role pig production and its status, management practices of pig, and challenges of producers in Biadr Taluka, Karnataka.

V. Refernces:

- The following are Reference and Related resources used in study of Pig Farming
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A STUDY ON RADIATION POLLUTION

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I. Abstract:

Knowledge of natural radioactivity in man and his environment is vital since naturally occurring radionuclides are the significant sources of radiation exposure to man. Radioactive pollution is the increase in natural background radiation emerging from the activities of human beings involving the use of naturally occurring or artificially produced radioactive materials. Radioactive substances are those which can emit high-energy particles like alpha (α), beta (β) and gamma rays. Disclosure of these radiations can cause damage to living cells and the environment. Radioactive pollution adversely affects human health, often leading to death. Since the radiation targets the genetic material, the defects caused are transmitted from parents to offspring. Therefore, it is the most dangerous form of pollution among all pollution types. Hence, preventing and controlling radioactive pollution is inevitable to avoid its harmful effects on human health.

Keywords: -Radioactivity, Radiation Sources, Radiation Pollution, Radiation waste Management.

II. Introduction:

Exposure to ionizing radiation originates from two significant sources: naturally occurring and artificial. Naturally occurring radioactivity on the earth's crust can be further classified into two distinct source categories: virgin and modified natural sources. Virgin sources of radiation are of cosmogenic or primordial (terrestrial) origin and have existed on the earth since primordial times. Modified natural sources are mainly from activities like mining, usage of fossil fuel, production of fertilizers or use of raw materials for building constructions. The study of radiation and its effect has been an important area of research for the last two decades.

Radioactive pollution is not a constant or regular phenomenon, and hence the duration and frequency of pollution will vary with time and conditions. The three major types of conditions exist.

- **Accidental pollution:** This type of condition exists during unintentional exposure to radiation by equipment failure, radiation leak, faulty protective equipment etc; and

- **Continuous pollution:** This condition exists in Uranium mines, nuclear reactors and laboratories where humans are constantly exposed to radioactive contaminants.
- **Occasional pollution:** This condition exists during isolated experiments or tests of nuclear substances.

III. Sources of Radioactive Pollution:

Radioactive pollution is increasing because of the increased use of radioactivity. It occurs mostly from the waste products that are left behind after the use of radioactive substances. Radioactive waste is usually the product of a nuclear process such as atomic fission, which is extensively used in nuclear reactors, nuclear weapons and other nuclear fuel cycles. Radioactive wastes are disposed of without any precautionary measures to isolate the emissions which then contaminate the air, soil and water.

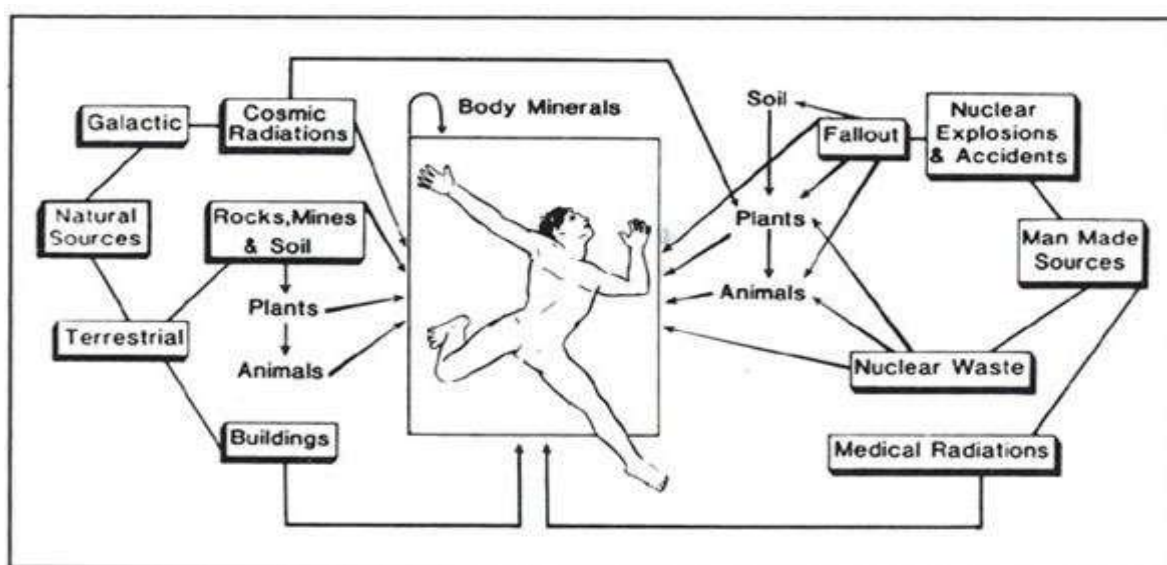


Figure1 . Sources of background exposure to man

Figure 1. Depicts the sources of background exposure to humans. A large amount of radioactive waste is generated from nuclear reactors used in nuclear power plants and for many other purposes. It occurs during the extraction and refining of radioactive material. Nuclear accidents and nuclear explosions are the two worst manmade sources of radioactive pollution. Table 1. Shows the radioactivity content in building materials.

Table 1 : Natural Radioactivity Content in Indian Building Materials(Menon *et al.*, 1987)

Material	⁴⁰ K	²²⁶ Ra	²³² Th	Radium equivalent
	(Bqkg ⁻¹)			
Cement	5-385	16-377	8-78	40-440
Brick	130-1390	21- 48	26 - 126	88 - 311
Stone	48-1479	6 - 155	5 - 412	24 - 311
Sand	5-1074	1-5047	4 - 2971	22 - 7759
Granite	76 -1380	4 - 98	103 - 240	25 - 525
Clay	6 - 477	7 - 1621	4 - 311	11 - 1865
Fly ash	6 - 522	7 - 670	30 - 159	56-773
Lime stone	6 - 518	1 - 26	1 - 33	5-148
Gypsum	70 - 807	7 - 807	1 - 152	59-881

The major sources where radioactive wastes are generated and are responsible for radioactive pollution are as follows: (i) Uranium mining, (ii) Production of nuclear fuel, (iii) Nuclear power reactors, (iv) Use of radionuclides in industries for various applications, (v) Nuclear tests carried out by the Defence Personnel.

Effects of Radioactive Pollution on Human Health:

Radioactive substances are among the most toxic substances known. Marie Curie, the Nobel laureate for the discovery of radioactivity in 1903, became a victim of radioactive pollution and died of Leukaemia. Low levels of radiation exposure on a small portion of the body may just affect the cell membranes and cause mild skin irritation. Other immediate effects of short-span exposure to nuclear radiation are nausea, vomiting, diarrhoea, loss of hair and nails, bruises owing to subcutaneous bleeding etc. High radiation exposures have much acute toxicity and can quickly kill the victim. In the case of living matter, these processes initiate a complex chain of radiochemical and biochemical events in the cells which may ultimately lead to biological damage (Fig. 2). High exposure to radiation in the gestation period causes brain damage. Infants between the eighth and fifteen weeks of pregnancy who were exposed to the atomic attack in Hiroshima and Nagasaki during World War II were reported to have a greater incidence of brain damage with side effects including lower Intelligent Quotient (IQ) and severe mental retardation in some cases. The most sensitive organs of human bodies to high radiation exposure are the intestines, lymph nodes, spleen, bone marrow and gonads. The radiation weakens the immune system of the body. The biological damage caused by the radiation depends upon the following factors: (i) The time of exposure, (ii) The intensity of radiation, (iii) The type of ionizing radiation (i.e. its penetration power), (iv) Whether the radiation is emanating from outside or inside the human body. Delayed effects of radiation include cataracts, leukaemia, malignant tumours, cardiovascular disorders, premature ageing and reduced life span. The radiation can cause irreparable damage to the genetic material and lead to life-threatening conditions. Radiation

causes genetic mutations that promote the growth of cancerous cells in the body. The effects of genetic mutation tend to pass on to the future generation.

Control of Radioactive Pollution:

Since radioactive pollution is highly hazardous to human health therefore prevention and control of radioactive pollution are inevitable. Radioactive pollution can be controlled in number of ways which are as follows:

1. Leakage from radioactive materials including nuclear reactors, industries and laboratories needs to be checked.
2. The disposal of radioactive material must be safe and secure.
3. Radioactive materials must be stored in safe places and must be changed into a harmless form.
4. Nuclear power plants must follow all the safety instructions.
5. The protective garments must be worn by the workers who work in the nuclear plants.
6. Nuclear devices should be exploded underground.
7. Production of radioisotopes needs to be minimized.
8. Extreme precautions should be taken during the disposal of industrial wastes containing radionuclide.
9. High chimneys and ventilations should be used at working places where radioactive contamination is high.
10. In nuclear reactors, closed cycle coolant system with gaseous coolants of very high purity may be used

IV. Conclusion:

Radioactivity discovery, due to later events proved to be of paramount importance, constituting the basis for a series of theoretical and practical achievements that led to solving problems of importance to release enormous energy contained in cores. But, the way humanity is facing the threat of radiation pollution also needs to be accounted for, as it leads to hazardous health issues. The management of radiation waste is also the need of the hour as we have seen so many accidents leading to the destruction of life. The regulations of the International Atomic Energy Agency (IAEA) and the Department of Atomic Energy (DAE) could help in controlling the radiation effect.

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Soft Skill for LIS Professional: A Study

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I. Abstract:

This paper will elaborate on the soft skills and competencies required for library professionals to increase the visibility and effectiveness of the librarian in the 21st century. In the field of library, science is developing a very fast impact of information technology, nowadays LIS professionals are not now limited only to traditional library services, but they have to keep themselves abreast of the current development and some soft skills in their field. Nowadays the job of LIS professionals is equal to IT professionals to cope with the new challenges in the field. LIS professionals should have performed with soft skills. With the sum of the important aspect of soft skills, with the definition of skills, significance of soft skills, soft skills are required for LIS professionals and various kinds of soft skills are required like communication, leadership, teaching, writing, customer services, e-skill, and information technology, domain knowledge, traditional librarianship, teamwork, interpersonal, presentation, and negotiation, etc.

II. Introduction:

In today's global environment and India has the second-largest population in the world. It is having huge manpower resources which are education and a lot of skills, however in comparison to the high level of education and skills. It is seen that there are skills a lot of people who are not employed. Nowadays required qualification in technical knowledge is not sufficient to cope with the latest development in a particular field. In the field of library, science is developing a very fast impact of information technology, nowadays LIS professionals are not now limited only to traditional library services, but they have to keep themselves abreast of the current development and some soft skills in their field. Nowadays the job of LIS professionals is equal to IT professionals to cope with the new challenges in the field. LIS professionals should perform with soft skills. Employment opportunities do not come only with hard skills education or experience. This is important to every employer most should have soft skills or the soft skills part of it. Employers prefer to employ those persons, who are resourceful, ethical, and self-directed with good soft skills, and this applies in all sectors and situations development of one's soft skills is equally important. Due to constant changes in Information and Communication Technology, the role of librarians and libraries has changed from storehouse of information and caretaker to actual learning center and information manager so;

information can be processed and delivered in a different way to the users. Due to this change library professionals also require some special skills and competencies apart from the basic skills and practices of librarianship. Nowadays or the 21st century, libraries are experiencing tremendous change. I.e. electronic information has occupied a huge place in the publishing industry. New types of information transfer channels here come into existence such as e-books, e-journals, databases, metadata, blog information, gateways, etc.

A. What do you mean by soft skills?

a. Definition: -

Soft skills are character, defined as the cluster of personality traits, social graces, facility with language personal habits, and interpersonal skills that, characterize a person's relationship with other people. In the workplace soft skills are considered to be a complement to hard skills, which refer to a person's knowledge and occupational skills, sociologists may use the terms soft skills to describe a person's emotional intelligence quotient (EQ) as opposed to intelligence quotient (IQ). According to Sarrafzadeh (2005): if LIS professionals remain reluctant to gain new skills, they will become irrelevant to their organization and will probably lose out in the competition for employment to people of other fields like scientists, engineering, and IT professionals, thus LIS professional must encounter rapidly changing environment that requires diverse skills new thinking and broader perspectives. They must be prepared to develop innovative ideas for the capture process and sharing of knowledge and demonstrate good management practices that want to remain relevant in the emerging knowledge age (Smythe, 1999). Hence the present-day library professional apart from their education-based practice required different types of soft skills and competency to provide the right information to the right user at the right time.

b. Significance of soft skills:

In the current global, environment of competition soft skills are playing a vital role in customer-oriented services. These skills are very suddenly catching up and down getting more importance from employers, students, LIS professionals, and other professionals. It helps them and every employer has soft skills of current and future development now with the essential qualification professional competencies are required, technical knowledge or hard skills covers subjects knowledge but soft skills, etc. soft skills can also be termed as life skills. So the only interagency does not mark, soft skills improve your personality attitude and interpersonal relation. Soft skills exhibit your real potential.

What are Soft skills?

We cannot specify the soft skills particularly however soft skills are a collection of several skills and abilities such as communication skills, interpersonal skills, listening skills, motivation skills, negotiation skills, reading and writing skills, management skills, and most important decision-making power skills. In this e-era smartness along with knowledge is highly appreciated. In the corporate world, soft skills with hard skills are mostly welcomed.

What are soft skills for Library professionals?

From the above discussion, it can be observed that this skill can also apply to the library profession. Libraries are now digital information learning and get away from the knowledge center. There is a great impact of information technology on libraries and library services. The services of the library should be user oriental. To deal with the different types of users according to their demands with hard skills, soft skills are also essential to flourish the library profession. The following are some of the soft skills useful for library professionals. This paper will elaborate on the soft skills and competencies required for library professionals to increase the visibility and effectiveness of the librarian in the 21st century. Nowadays merely having a professional degree in the library science field is not desirable for employment. There is a demand for librarians to have multidimensional aptitude in their areas of technical work, administrative work, and also in providing user-oriented services along with soft skills like any other profession the soft skills are required in day-to-day working for caressing out routine jobs more effectively. The librarians working in large organizations like corporate offices are already practising these skills through experience or training. The following are some of the soft skills useful for library professionals.

01. Communication Skill:

Communication skills are the most important and necessary at all levels of management. Communication is the way library leaders can bridge the gaps stay in touch build trust monitor performance and attain the concerted vision. Proper communication helps in controlling misunderstandings and conflicts and improving coordination in the groups. Reading writing learning speaking listening presenting are also important parts of communication skills.

02. Leadership Skill:

Leadership skills can be considered to be the personal qualities behaviors styles and decisions of the leader. The function of leadership is to produce more leaders, not more followers. Leadership skills are very important for the 21st-century library professionals.

03. Teaching Skill:

The librarian should be good to orient the users to the library services. Librarian professionals should have good teaching skills; this will be helpful to inculcate reading habits among users.

04. Listening Skill:

Listening skill is very most useful to interact with the users like (i.e. higher Authorities Management, Staff, Students, Visitors, and Percent) of different age group, with users of different age group their requirement varies by carefully listening to users one can exactly identify the demand of them.

05. Writing Skill:

Writing skill is also equally important and part of communication. The librarians are sometimes asked to submit/help in writing research proposals/business proposals/projects report and books supplying purpose, which requires good writing skills to play a very important role for library professionals during written communication with users, management, publishers, and suppliers.

06. Customer Services Skill:

In the library field the users are considered as the customers of library users and to satisfy their information needs customer services. The librarians are always giving attention to their user needs and providing some through CAS SDI or other services must be users oriented, these services should satisfy the user and assures guarantee that users will always come back to the library.

07. E-Skill or Information Technology Skill: -

In the LIS professionals should know IT skills, nowadays information has a great impact on library and information services, and librarians should have strong knowledge and capability in the following Integrated Library System (ILS): knowledge about E-based or IT-based library services. (E-book, computer networking, scanning, copyright, e-publishing). Emerging Web Technology: the major trends in web development include online social networking tools (Twitter, Facebook, WhatsApp, and Instagram, etc) Electronics Resources Management should have how digital resources are acquired managed, and accessed. (Database, Metadata, e-journals. etc...)

08. Domain KnowledgeSkill:

Domain Knowledge or Subject is also essential in every profession. The library profession has to deal with different types of user groups with their needs. Subject knowledge helps them to make good communication and provide the right information to the right user at the right time the users.

09. Traditional Librarianship Skill:

Library professionals should have traditional librarianship skills, like the bellows.



10. Team WorkSkill:

Teamwork skill is also very important in the field of Library and information center or library management, give library services to users is not the job of librarians alone. It is teamwork. Hence it requires having leadership or managing skills on how to manage and guide the team from time to time so that all libraries subordinate are carrying out their work efficiently it will be smooth running the library.

11. Competencies:

Understanding User needs, Conversation of Traditional Services web-based, Building print and non-print collection, Self-evaluation of services, Comparison of Technologies, Attraction of users towards the library, being ready to embrace change and Learning & use new technologies.

12. Interpersonal Skill:

Interpersonal skill is also equally important in the library field; librarians have to deal with all levels of peoples like higher officers visiting in the library, Management Authorities, Principal, Users, a colleague in the library and vendors etc...that's the way work librarian have should the interpersonal skills. When you work in a large organization, it is most important to build rapport with all departments which helps in managing the library and providing better services to everyone and every user.

13. Presentation Skill:

Presentation skills are required in writing a library report, library committee meetings, library presentation when the NAAC committee visit the library, orientation program, and even in the daily work which represents the library management overall for users.

14. Public Relation Skill:

The library profession needs to use public relations very effectively to attract users to libraries, in various ways. It helps to bond with users and vendors too and it's also the ability to work with other professionals.

15. Negotiations Skill:

Librarians should have negotiation skills required on special occasions such as handling bulk purchasing like books, furnishers, and specialized databases subscription with suppliers or vendors, etc. same time in a delicate situations like library committee meetings and avoiding undue requirements.

16. Project Management Skill:

Library professionals should know about project management skills. In the corporate sector, many times librarians are required and librarians are part of some project teams and assigned specialization jobs such as knowledge management or digital institutional repository, that time librarians should know about time management, understand the project, teamwork, and report back the result, etc.

17. Information Literacy Skill:

The Librarians should have understood the principles of information literacy, data literacy, learning, and teaching pedagogy and models in the academics environment.

18. Research Contribution to the profession skill:

Research contributions to the professional skills know a research and publication contribution through writing, editing referencing, or reviewing of books or reports, formal study, teaching a course in areas of librarianship.

19. Conference Management Skill:

The librarian should know conference management skills, like planning, organizing, processing printing, time management resources models and methods knowledge of the fundamentals of quantities and quantitative research methods, (e.g. question formulation, peer reviewer).

20. Web page Development Skill:

The librarian should know web page development skills. Librarians have an understanding of the principle of web page development and maintenance, institutional repositories, learning management systems, database management.

III. Conclusion:

From the above discussion, it can be concluded that soft skills are playing a very vital role in the LIS field. The LIS profession is one of the challenging fields to cope with the situation in this era of information technology. To manage the situation librarian professionals should have some of the important competencies and soft skills which are very much required to satisfy the user's community as discussed in the paper. There are many soft skills training programs available in institutes and corporate in India to ensure that the employability of the young generation increases and to give some guidelines on how training conducted on soft skills can be measured to make them more effective. There are different types of job opportunities in the LIS field with new challenges technical knowledge and domain knowledge help us to service but competencies help us to succeed in life. So the systematic blending of hard skills with soft skills always accelerates the profession in the right direction.

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INFLUENCE OF SPORTS PARTICIPATION ON THE SELF CONFIDENCE AMONG DEGREE COLLEGE STUDENTS OF BIDAR DISTRICT

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I. Abstract:

In this present study, the researcher tried to find out the significant difference in self-confidence among the degree college students of the Bidar district Karnataka India. Self-confidence is one of the dynamic factors in the personality of sports players. The self-confidence level is showing the self abilities or self believe on the capacities of an individual. The research study's aims and objectives are as follows – to measure the self-confidence level among the degree college students of the Bidar district. To compare the self-confidence among sports participants and non-sports participated in student's bidar district. The research hypothesis stated that there would be an influence of sports participation or involvement in sports activities on the self-confidence among degree college students of the Bidar district. There would be a significant difference in self-confidence levels among sample groups. The research tool used - The self-confidence questionnaire is developed by M. Basavanna (1971). This questionnaire consists of 100 items. The items are scored according to the scoring key. Accordingly, the one who scores high is said to have lower self-confidence and vice-versa. The add-even split-half reliability was calculated and the reliability co-efficient as corrected by the Spearman Brown proper formula was found to be 0.94. The data was collected by both respondents and analyzed through statistical tests like mean, SD and t-tests to prove the research hypothesis of the study.

Key words – self confidence, sports and non sports persons, sports participation.

II. Introduction:

Self-confidence is an individual's perceived ability to act effectively and attain success. It is the perception of a person about himself. Any act of success or failure is largely determined by self-confidence. Therefore it is believed that self-confidence increases one's potential to perform. Higher confidence is always a boosting factor for given activity Initially most of the research work in

physical education and sport was carried out in science-related disciplines like exercise physiology, biomechanics, nutrition, physical fitness and anthropometry. Researchers in these fields thought that factors present in these areas were chiefly responsible for the performance of a sportsman in competitive sports. The role of psychological factors like personality aggression, anxiety, achievement, motivation, self-confidence, stress etc. has been investigated by various researchers for their possible contribution to sports performance. When the desire for achievement becomes a dominant concern for the person, it is expressed in restless driving energy aimed at achieving excellence, getting ahead, improving on records, defeating competitors, doing things better and faster and more efficiently and finding unique solutions to difficult problems. People with strong achievement generally are self-confident individuals who are at their best taking personal responsibility in a situation where they can control what happens to them.

III. Methodology:

The objectives

- ❖ To measure the level of self-confidence of the sportspersons and non-sportspersons of the Bidar district.
- ❖ To compare the self-confidence among sportspersons and non-sportspersons of the Bidar district.

The hypothesis of the study –

- ❖ There would be the influence of sports participation on self-confidence among degree college students
- ❖ There would be a significant difference in self-confidence among the sample group.

Sample of the study –

Fifty sportspersons and fifty non-sportspersons were selected as sample of the present research study; all subjects were the male and same age group.

Research tool used –

The self-confidence questionnaire is developed by M. Basavanna (1971). This questionnaire consists of 100 items. The items are scored according to the scoring key. Accordingly, the one who scores high is said to have lower self-confidence and vice-versa. The add-even split-half reliability was calculated and the reliability co-efficient as corrected by the Spearman Brown proper formula was found to be 0.94. The data was collected by both respondents and analyzed through statistical tests like mean, SD, and t-tests to prove the research hypothesis of the study.

IV. Data Analysis & Interpretation

Table No 1 showing Means, SDs and t-value of Self Confidence of sportspersons and Non sportspersons of Bidar district.

Sports participation	N	MEAN	SD	t-value
Sportsperson	50	38.44	6.584	5.546**
Non Sports person	50	46.96	9.395	

**Significant at 0.01 level.



The table shows that sportspersons are more confident than non-sportspersons; the study also revealed that sports involvement has a major association with the self-confidence level of an individual. Sports participation has a positive influence on the psychological variable self-confidence levels among the sample of the study, the sports participants or sports players are more self-confident than the non-sports participated students of the bidar district.

V. Conclusion:

- ❖ The study revealed that there is a significant difference in self-confidence between sportspersons and non-sportspersons.
- ❖ There is an influence of sports on the level of self-confidence of an individual.
- ❖ Sports participation boosts confidence in individuals.
- ❖ The sports participated students are better in psychological variable self-confidence than the non-sports participated students of the Bidar district.

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Effect of Glyphosate on Germination and Growth of *Lablab Purpureus*

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I. Abstract:

Glyphosate, N-(phosphonomethyl) glycine, is the most extensively used herbicide in the history of agriculture. Weed management programs in glyphosate-resistant (GR) field crops have provided highly effective weed control, simplified management decisions, and given cleaner harvested products. However, this relatively simple, broad-spectrum, systemic herbicide can have extensive unintended effects on nutrient efficiency and disease severity, thereby threatening its agricultural sustainability. This manuscript reviews the effect of glyphosate on the germination and growth of *Lablab purpureus*.

II. Introduction:

Glyphosate N-(phosphonomethyl) glycine is a broad-spectrum, non-selective; post-emergence herbicide that is widely used in agriculture. The commercial success of glyphosate as a highly effective herbicide has stimulated several studies on its behaviour and persistence in soil. It was discovered by J.E. Franz in Monsanto crop in 1971 and released commercially in 1974 in the early 1980s it became the first individual herbicide with a worldwide sale of over 1 billion dollars. Structurally, glyphosate resembles an amino acid especially since it is reminiscent of phosphorylated glycerine. Glyphosate $\text{H}_2\text{PO}_3\text{-CH}_2\text{-NH-CH}_2\text{=O-OH}$. It is a glycine derivative that acts as a competitive inhibitor of an enzyme 5-enol pyruvate shikimate 3-phosphate synthetase. Phospho enol pyruvate and glyphosate as structural similarities glyphosate binds more tightly to the enzyme than phosphoenol pyruvate (PEP) and its dissociation rate is lower than PEP. *Lablab purpureus*, commonly known as bonavist, lablab or Hyacinth bean, is a legume species native to Asia (Piper and Morse 1915, NAS 1979) or Africa (Vavilov 1949). Apart from being popular as a vegetable or a pulse in

Asia, *Lablab purpureus* is widely known as a forage or green manure crop in the tropics and subtropics (Wood 1983, Shivshankar et al. 1993). The plant has many outstanding qualities it is tolerant of high temperatures and drought, can thrive in deep sands to heavy clays and is a large buck of green material with high protein concentration (Kay 1997). These qualities enable the plant to provide food, fodder and soil protection during prolonged dry periods when many other plant species have become desiccated. The aim of the work evaluated the effect of glyphosate herbicide on the growth and germination of *Lablab purpureus* as well as its effect on soil microbes (with and without a previous history of glyphosate application) and to determine which concentration has fewer side effects.



Objectives

- Effects of glyphosate on the growth of *Lablab purpureus*.
- Effect of glyphosate on the germination of *Lablab purpureus*.

III. Review of literature:

The herbicide glyphosate, N-(phosphonomethyl) glycine has been used extensively in the past 40 years under the assumption that side effects were minimal. However, in recent years, concerns have increased worldwide about the potential wide-ranging direct and indirect health effects of the large-scale use of glyphosate. In 2015 the world health organization reclassified glyphosate as carcinogenic to humans. A detailed overview is given of the scientific literature on the movement and residues of glyphosate and its breakdown product amino methyl phosphonic acid (AMPA) in soil and water, their toxicity to the micro and macro organism, their effect on microbial composition and potential indirect on germination of seeds and plant growth, animals and human health. Although the acute toxic effect of glyphosate and AMPA on mammals is low, animal data are raising the possibility of health effects associated with chronic, ultra-low doses related accumulation of these compounds in the environment. Intensive glyphosate use has led to the selection of glyphosate-resistant plants and microorganisms. Shifts in microbial compositions due to selective pressure by glyphosate may have contributed to the proliferation of plant and animal pathogens. Research on a link between glyphosate and antibiotic resistance is still scarce but we hypothesize that the selection pressure for glyphosate resistance in bacteria could lead to shifts in microbiome composition and increases in antibiotic resistance to clinically important microbial agents. We recommend interdisciplinary research on the association

between low-level chronic glyphosate exposure, distortion in microbial communities, expansion of antibiotic resistance and the emergence of animal, human and plant diseases. Depend on research is needed to revisit the tolerance thresholds for glyphosate residue in water, food and animal feed taking all possible health risks into account.

IV. Methodology:

Effect of glyphosate on seed germination of *Lablab purpureus*:

Seeds of *Lablab purpureus* were collected randomly from the cultivated crops. The seeds were kept in sunlight for 48 hrs and the husk of dried seeds was removed by rubbing with hands. Seeds were washed and soaked in distilled water for 24 hrs they were washed thoroughly and kept for germination in Petri dishes with moistened double-layered filter paper to see the germination process. 1000PPM of herbicide solution was used as a stock solution to prepare lower concentrations. The concentration of herbicide ranging 100ppm to 1000ppm, one Petridis is taken as standard. The PH values of each concentration of herbicide were determined using Blackman's PH meter. To study the effect of glyphosate on germination, 15 seeds per Petridis were immersed in 50ml of an aqueous solution of each concentration of herbicide for 24hrs. After treatment seeds were washed thoroughly with distilled water and allowed to germinate for an experiment under laboratory conditions in 4-inch diameter Petridis containing double-layered moistened filter papers. Similarly, 15 seeds per Petridis were used for the experiment. The experiment was performed in triplicate for each treatment. Observations were recorded daily, till the process of germination come to cease in each concentration of herbicide. The emergence of the radicle was taken as a criterion for germination. An average length of hypocotyls and radicle was separately using 7 days old seedlings. The actual percentage of germination and length of hypocotyls and radicle has been graphically presented based on the mean value of three replicates.

Effect of glyphosate on growth of *Lablab purpureus*:

The black soil collected the stones and litter was removed from the soil and filled in 6 pots. The seeds of *Lablab purpureus* were sown in the six pots in the moisture-containing glyphosate. The glyphosate is exposed to a pot with water media in different concentrations to different pots. The six pots named pot-1, pot-2, pot-3; pot-4 and pot-5 are exposed to water containing glyphosate of concentration 0.1ml/litre, 0.5ml/litre, 1ml/litre, 2ml/litre and 5ml/litre respectively. The pot 6th one is taken as standard, where normal tap water will be used. The pots are exposed to a growth media or water containing glyphosate once a day at a volume of 1 litre. The growth and germination of the *Lablab purpureus* will be measured with the help of scale. The sown 12 seeds of *Lablab purpureus* in each pot are watered with glyphosate at the concentration of 1000ppm, 5000ppm, 10000ppm, 20000ppm and 50000ppm to the pot-1, pot-2, pot-3, pot-4, pot-5 respectively. The pot-6 is taken as standard.

1ppm=1mg/litre

1mg=0.001ml

1 ml dissolved in 1 litre of water gives 1000ppm solution.

Pots Name Glyphosate concentration	ml/litre	Ppm/litre
01	0.1	1,000
02	0.5	5,000
03	1.0	10,000
04	2.0	20,000
05	5.0	50,000

Result: It was found less effective in checking the growth of the Lablab purpureus. The growth of the Lablab purpureus is gradually decreased from 0.1 ml/litre of glyphosate to 5 ml/litre. Where the standard pot shows luxurious growth of the Lablab purpureus was seen. At 50,000 ppm where growth of the Lablab purpureus as well as germination was very less, therefore it proves as a lethal dose. Pot-1,pot-2,pot-3,pot-4,pot-5 are watered containing glyphosate of concentration 0.1ml/litre, 0.5ml/litre,1ml/litre,2ml/litre,5ml/litre respectively. Pot-6 was taken as standard where normal water was used.

Date	1(0.1ml/ltr) 1.average shhot growth 2.no of seeds germinated out of 12	2(0.5ml/ltr) 1.Average shoot growth 2.No of seeds germinated out of 12	3(1ml/Ltr) 1.average shhot growth 2.no of seeds germinated out of 12	4(2ml/Ltr) 1.average shoot growth 2.no of seeds germinated out of 12	5(5ml/Ltr) 1.average shoot growth 2.no of seeds germinated out of 12	6 (Normalwater) 1.average shoot growth 2.no. of seeds germinated out of 12
29/2/20	Cultivation at 1 o clock	Cultivation at 1 o clock	Cultivation at 1 o clock	Cultivation at 1 o clock	Cultivation at 1 o clock	Cultivation at 1 o clock
01/3/20	No changes	No changes	No changes	No changes	No changes	No changes
02/3/20	No changes	Germination of	Germination of 2	Germination	No changes	No changes

		1 seed	seeds	of 2 seeds		
03/3/20	Germination of 3 seeds	Germination of 3 seeds	Germination of 4 seeds	Germination of 2 seeds	No growth	1)0.9cm 2)10seeds
04/3/20	1)2cm 2)11seeds	1)1.7cm 2)10 seeds	1)1.125cm 2) 9seeds	1)0.75cm 2) 5 seeds	1) No growth 2) germinating Cotyledons are seen	1)4.25cm 2) 10 seeds
05/3/20	1)3.05cm 2) 11 seeds	1) 3.16cm 2) 10 seeds	1)2.14cm 2) 9 seeds	1)2.25cm 2) 7 seeds	1) No growth 2) germinating cotyledons are seen	1)4.67cm 2)10 seeds
06/3/20	1)4.29cm 2)10(2 leaf stage)	1) 3.16cm 2) 10(2 leaf stage)	1) 2.41cm 2) 9(stunted- 2, 2 leaf stage)	1)3cm 2)7(3-still germinating,2 leaf stage)	1) No growth 2) germinating cotyledons are seen	1) 4.6cm 2)10(2 leaf stage)
07/3/20	1)5.35cm 2)10(2 leaf stage)	1)4.94cm 2) 9(2 leaf stage) 1 degraded	1)2.92cm 2)9(2 leaf stage) 2 still germinating	1)4.16cm 2)6(2leaf stage) 1 seed is disintegrated	1)No growth 2)2seeds are still germinating	1)5.89cm 2) 10(2leaf stage)
08/3/20	1)6.04cm 2) 10(2 leaf of diameter 1.8cm)	1)6cm 2)9(2 leaf of diameter 1cm)	1)3cm 2)9(2 leaf stage) 2 are still germinating	1) 4.5 cm 2) 6(leaf stage with diameter 1.2cm)	1) No growth 2) seeds are still germinating	1) 6.65cm 2) 10(2 leaf of diameter 1.7cm)
09/3/20	1)7.75cm 2)10(2 leaf of diameter 1.8cm)	1)5.88cm 2) 9(2 leaf of diameter1.3cm)	1)3.16cm 2)9(1 degrading)leaf shrinking	1)4.2cm 2)6(2 leaf of diameter 1.2cm)	1)No growth 2)seeds are still in same condition	1)7.4cm 2)10(2 leaf of diameter 3cm)
10/3/20	1)7.76 cm 2)10(2 leaf of diameter 1.7cm)	1)6.5 cm 2)9(2 leaf of diameter 1.5cm)	1)3.15 cm 2)8 leaf are shrinking	1)4.2 cm 2)6(2 leaf of diameter 1.5cm)	1)No growth 2) germinating seeds are showing	1) 7.5cm 2)10(3 leaf stage of diameter 3.3cm)
11/3/20	1)7.5cm 2)10(2 leaf diameter of 1.8cm)	1)7cm 2)9(2 leaf diameter of 1.5cm)	1)3.18cm 2)8 leaf are shrinking	1)4.33cm 2)6(2 leaf of diameter 1.5cm)	1) No growth 2) germinating seeds showing degradation	1)7.63cm 2)10(5 leaf stage of diameter2.5cm)

12/3/20	1)8.41cm 2)10(2 leaf stage of diameter 2cm)	1)7.1cm 2)9(2 leaf of diameter 1.5cm)	1)3.19cm 2)8 plants and germinating seeds showing degradation	1)4.66cm 2)4 leaf showing curls	1) 2)Degraded	1)11.55cm 2)10(5 leaf stage of diameter 3cm)
13/3/20	1)8.45cm 2)10(2 leaf of diameter 2cm)	1)7.1cm 2)9(2 leaf of diameter 1.5cm)	1)3.5cm 2)8 plants and germinating seeds showing degradation	1)4.66cm 2)4 leaf showing curls	1) 2)Degraded	1)11.55cm 2)10(5 leaf stage of leaf diameter 3cm)showing luxurious growth

Table 1:

Showing growth and length of Lablab purpureus plant (in cm) of 14 days of growth at various concentrations of glyphosate. In seed germination, it was found less effective in checking the percentage of seeds.

Germination: The percentage of seed germination gradually decreases from 98.0 in control to 17.0 at 20000 ppm, respectively. Thus at 5000, 10000, 20000, and 25,000 ppm, the germination percentage was 78.0, 59.0, 40.0, 17.0 and 0 respectively. At 25000 ppm the germination percentage was 0.0 therefore, it provides a lethal dose. The pH at control and 25000 ppm was 7.0 and 5.5 respectively.

The length of hypocotyls was 30.33, 21.0, 9.33, 3.0 and 0.0 mm at 5000, 15000, 20000 and 25000 ppm respectively, whereas in control it was 40.33 mm. Similarly, the length of the radicle was reduced with increasing concentrations of herbicides. The length of the radicle was 11.33, 7.0, 2.7, 1.33 and 0.0 mm at 5000, 10000, 15000, 20000 and 25000 ppm respectively. Glyphosate showed more morphological changes in the early seedling growth such as swollen hypocotyls and radicle and swelling was pronounced at the junction of hypocotyls and radicle, the cotyledon become thick and yellow as compared to control at each concentration of herbicide.



Table-2:

Showing percentage of seed germination and length of hypocotyls and radicle (in mm) of seven days of old seedlings at various concentrations of glyphosate.

Herbicide	Conc.(ppm)	Germination percentage	Standard error	Hypocotyls length (mm)	Standard error	Radicle length	Standard error
Glyphosate	Control	98.0	0.81	40.33	0.70	15.7	0.65
Glyphosate	5000	78.0	1.41	30.33	1.32	11.33	1.27
Glyphosate	10,000	59.0	0.81	21.0	0.81	7.0	0.81
Glyphosate	15,000	40.0	0.81	9.33	1.27	2.7	0.50
Glyphosate	20,000	17.0	1.41	3.0	0.81	1.33	0.48
Glyphosate	25,000	00	-	00	-	00	-



Petridish 4

Control (C)

fig no .2 C Control seedling , 4 - checking of cotyledon at 20,000 ppm treated with glyphosate .

Discussion:

In the present study, the herbicide inhibited seed germination and early seedling growth. Many workers reported a stimulatory effect on seed germination of various plants and weeds. Upchurch and Baird 1972 reported that crops planted immediately after the application of glyphosate was not injured and germination was not affected. Mohier Etakl 1976 reported that glyphosate did not reduce significantly the percentage of seed germination of poa pretences, Festuca rubra and festua abundance was not significantly different from control when treated with glyphosate. Stecko 1977 studied the effect of glyphosate on the germination of seed in 9 species of crop plants and weeds, where the germination process itself was not affected. Moshier and Penner 1978 reported that glyphosate does not reduce the seed germination percentage in Medicago sativa in Petri dishes. Egley and Willions 1978 absorbed seed germination in Seda spinosa, Abutilon Theophrasti, Echinochola Crusgalli and Sorghum Halepense after application of this herbicide and reported that there was no effect on seed germination. However, in the present study, the percentage of seed germination decreases gradually. It was probably due to the variation in the rate of uptake of herbicide at different concentrations. Progressive inhibition of the growth of hypocotyls and radicles was observed with increasing concentrations of herbicide. The length of hypocotyls and radicle was decreased to less than half as compared to control at 10,000ppm. Moshier etal. 1976 showed that the shoot length of bluegrass and creeping bentgrass was reduced when seeds were treated with glyphosate solution. Stecko 1977 observed stunted root and shoot growth in 9 species of crops and weeds. Hoagland 1977 reported that glyphosate reduces the length of root and shoot in 11 species of crops and weeds. Egley and Willions 1978 observed a reduction in the length of seedlings of Bam yard grass and Jhonson grass after the application of glyphosate. Haderlie etal. 1978 observed that the elongation seedling axis was inhibited by glyphosate in soybean. The growth of Lablab purpureus is gradually decreasing from 1000ppm to 50,000ppm. At 50,000ppm glyphosate concentration there is no growth hence, that concentration is lethal for the growth of Lablab purpureus the standard one was the normal water was taken which shows luxurious growth. Some seeds are degraded after their germination in all concentrations of glyphosate. The seedlings produced from the seeds treated with glyphosate where normal in appearance except change in the colour of hypocotyls. After 20,000ppm all seedlings become pale yellow. Similar results were also reported by Kingman and Murray in 1978 in Turf grass and Hoagland in 1977 in 9 species of crops and weeds. Jain 1993 in chenopodium album, Bobde 1993 crotalaria medicaginea var luxurious. In the present study, the range of PH from control to 25,000ppm was 7.0 to 5.5, e PH value decreasing gradually towards acidity as the concentration increases. It observed that the germination percentage was not reduced in the growth of seedlings.

V. Conclusion:

It was clear from the above experimental work that the growth of Lablab purpureus decreases as the concentration of water containing glyphosate increases from 0.1ml/litre to 5ml/litre and some plants of Lablab purpureus showed stunted growth in all concentrations of glyphosate. Where standard luxuriant growth will be observed. Similarly, in seed germination of Lablab purpureus, the germination rate decreases as the concentration of the glyphosate increases. The concentration of 25,000ppm proved lethal for the germination of Lablab purpureus seed.

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GANODERMA: A POTENTIAL FUNGUS

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I. Introduction:

Ganoderma is a family of Polyporales with seven accepted genera. Members of Ganodermataceae are cosmopolitan basidiomycetes and are distinct from other families of Polyporales in having a particular type of double-walled basidiospores.[1] Ganoderma originates from Greek meaning shining skin, ganos meaning brightness and derma meaning skin.[2] Ganoderma is a prolific producer of novel 'mycochemicals. Lingzhi is the Chinese name given to the basidiospores of Ganoderma as isolated in the vast and diverse country [3] a search for Ganoderma in the database index fungorum displayed 428 species records, including synonyms. Taxonomic studies report more than 300 species in the genus Ganoderma, and most of them are distributed in tropical regions.[4] White rot wood decaying with a hard fruit body is a basidiomycete [5]. The fungus which has been used for medicinal purposes in a country particularly in China, Japan, and Korea [3]. Wood decay fungi cause white rot to degrade both lignin and polysaccharides in food [6]. Ganoderma species are distributed worldwide and fruiting bodies of Ganoderma grow from living or more commonly from dead trunks or branches of trees. they grow facultative parasites that can live as saprobes on decaying wood. Double-walled basidiospores with pillars are the key diagnostic feature for the genus [1]. Since the earliest times, the mushroom has been treated as a special food they have been widely consumed not only for their taste, texture and nutritious composition but also for their claimed therapeutic value [7]. White rot fungus has been used as a health-preserving and therapeutic agent. [8] Ganodermataceae family includes about 40 similar species with hard basidiocarps (fruit bodies) in red, white, yellow, purple or other colours. Ganoderma is being produced on a large scale for pharmacological and clinical studies by artificial cultivation submerged fermentation Species that are used for fermentation purposes are *G. lucidum*, *G. japonicum*, *G. capense*, *G. applanatum*, *G. boninense* and *G. tsugae*. [7] Modern pharmacological and clinical trials have demonstrated that Lingzhi showed a significant effect on the prevention and treatment of various diseases [9]. Ganoderma species are generally not listed among edible mushrooms because their fruiting bodies are thick corky and tough and do not have fleshy texture characteristics. It is a genus of traditionally used medicinal mushrooms. Crude extracts of Ganoderma species are used as remedies for the treatment of several ailments including cancer. A recent study of Ganoderma in Scitinder scholar gave more than 6500 publications of which nearly half were written in the Chinese language [14].

II. Ecology and distribution:

Distribution:

The distribution of Ganoderma species covers all over the world, especially in tropical, subtropical and temperate areas [10]. Among the totally 213 species in genus Ganoderma, 100 species were reported from China according to the data base of checklist of fungi in China. Ganoderma is also mostly distributed in tropical and subtropical areas in China. [10]

Habitat:

Ganoderma species have worldwide distribution in both tropical and temperate geographical regions, growing as parasite or saprotroph on wide variety of trees. In the wild, Ganoderma is often solitary or gregarious at the dead trunks, fallen wood, rotten wood, rotten rots and stumps of deciduous, coniferous or mingled forest. Most of the species grown on deciduous trees such as *Alnus* species, *Betula* species, *Castanea* species, *Castanopsis* species, *Cyclobalanopsis* species.[10]Some species grow on specific habitat for example, *G. achalceum* mainly parasites on *Dacrycarpus* species, *G. mirabilia* can grow at higher position of trunk, *G. philippi* mainly grows on *Heave* species, *G. tropicum* mostly parasites on *Acacia* species, *G. tsugae* only grows on coniferous tress, and *G. trulla* grows on *Castanopsis hystrix* of Hainan Island and Indonesian islands. In addition, *G. applanatum* *G. aurstale*, *G. lobatum*, *G. tropicum*, *tsugaes*. *Tsunodae* and *G. weberianum* can parasitise not only on rotten trees, but also living trees [10]

Conditions and requirements for growth:

Nutritional condition:

Ganoderma is a cosmopolitan genus of white rot fungi of economic importance, and some of the species are recognised as a potentially important source of lignin-degrading enzymes which have been shown to selectively delignify wood. Ganoderma can grow on rotten trees in broad-leaved and xylem. In substitute's cultivation, the carbon source mainly comes from the sawdust of broad-leaved tree, cottonseed husk, corn cob and soybean straw, and the nitrogen source from bran. The more reasonable ratio of main and auxiliary materials is of great importance for the cultivation of Ganoderma with high yield and great quality [10].

Environmental condition:

Temperature:

The hyphae of Ganoderma species can grow between 5 and 35 °C. Hyphae can withstand low temperature of 0 °C, maintaining the lowest physiological activity, but will stop growing and will

return to normal growth when the temperature rises to an appropriate level. The optimum temperature for the growth of hyphae in the matrix is 25–30 °C, and 24–26 °C is the suitable temperature for the germination of basidiospore. Fruit body can differentiate between 24 and 28 °C and develop normally at 25–30 °C. Intense temperature variations can cause pileus deformity [10].

Moisture:

Ganoderma species is a hygrophilous fungus. Relative humidity in air should be maintained between 65% and 70% during the hyphae growth, which will prevent the moisture in the matrix from evaporating. The relative humidity of air should be maintained between 85% and 90% during the development and growth stages of fruit bodies. If the relative humidity is less than 60%, serious evaporation of water in the matrix and hyphae would cause water shortage and growth inhibition of fruit body. If the relative humidity is lower than 45%, the growth of the hyphae would stop and the young fruit bodies die. Besides, if the relative humidity is higher than 95%, the respiration of hyphae and fruit body would be blocked because of the decreasing oxygen content in the air, resulting in hyphae autolysis and the fruit body decaying to death. The water content of the matrix should be 37%–40% in the wood-log cultivation. In substitute cultivation, 60%–65% of the water content is suitable. When the water content in the culture medium is higher than 80%, the low oxygen content easily causes the death of the hyphae [10].

Oxygen and carbon dioxide:

Ganoderma is an aerobic fungus. If the oxygen is insufficient, the hyphae grow slowly during the stage of the hypha growth. When hypoxia is serious, it stops growing. Under natural conditions, the concentration of carbon dioxide in air is 0.03%, and the hyphae of Ganoderma could grow normally. Increasing the concentration of carbon dioxide can promote the growth of hyphae, and the growth rate can be accelerated by more than two to three times when the concentration of carbon dioxide increases to 0.1%–10%. The development of fruit bodies is sensitive to carbon dioxide in the air. The suitable content of carbon dioxide in the air for the differentiation and growth of fruit bodies is 0.03%–0.1%. When the concentration of carbon dioxide is higher than normal, the shape of the fruit body will be affected, the growth will be inhibited, and the stipe will become antler-like branches and may even not form a fruit body [10].

Acidity and alkalinity:

Ganoderma species are suitable for acidic growth conditions. Hyphae can grow in the range of pH 3–9, and the most suitable pH value for hypha growth is 4.5–5.2. The growth rate of hyphae will slow down when pH is 8 and will stop growing when pH is higher than 9. Under alkaline conditions, the

solubility of inorganic ions such as calcium ion and magnesium ion will increase, which can inhibit the activities of various enzymes, synthesis of and normal metabolic [10].

Illumination:

Ganoderma is a heterotrophic fungus, which cannot carry out photosynthesis. The hyphae can grow normally under dark conditions. Blue and purple light in visible light have obvious inhibitory effect on hypha growth. Ultraviolet radiation at 260–265 nm can destroy the RNA, DNA and nucleoprotein in hyphae, and the hyphae can be killed by ultraviolet radiation about 30 min. Direct sunlight is harmful to hyphae. The stronger the light is, the more harmful to hyphae. The red light at 570–920 nm is harmless to growth. The differentiation of the fruit body requires induction of blue light (about 400–500 nm). In dark or weak light condition (illumination: 20–1000 lx), only stipe grows and no pileus forms. When the illumination intensity reaches above 1500 lx, the bud grows fast and can form a normal pileus. The stipe has phototaxis, and the light in one direction can promote the stipe to grow in the direction of strong light and become too long. The growth of the basidium is photophobic. Purple light and ultraviolet are harmful to its growth particularly, but it needs to be induced by purple light when hyphae differentiate into basidium. Blue and purple light are harmful to the development of basidiospore. During the cultivation process, the light around the mushroom shed should be as uniform as possible, and the cultivation bags and wood logs should not be moved frequently to prevent the pileus from deformity [10].

Review of literature:

Classification and detail structure:



Ganoderma applanatum

Scientific classification [10]:

Kingdom:	Fungi
Division:	Basidiomycota
Class:	Agaricomycetes
Order:	Polyporales
Family:	Ganodermataceae
Genus:	Ganoderma

Genera of the family ganodermataceae:

According to the international fungal name database Index fungorum there are seven accepted genera and another eight synonymes in the family ganodermataceae,

Number of species and infraspecific taxa described in ganoderma:

According to the international fungal name database Index Fungorum (<http://www.indexfungorum.org/>, accessed 30th March, 2019), there are 213 accepted species and infraspecific taxa in the genus Ganoderma.[10]

Systemic classification [11]:

Division:	Eumycota
Sub division:	Basidiomycota
Class:	Hymenomycetes (Basidiomycetes)
Sub class:	Holobasidiomycetidae
Order:	Aphylllophorales
Family:	Ganodermataceae
Genus:	Ganoderma

From the classification, Ganoderma is a true fungus of the basidiomycetes. Fungi from this class produce basidiomes. The fungus bears single-celled basidia and so called homobasidiomycetes. The hymenophore is in the form of tubes. Hence, the fungus is a polypore. The Ganoderma lucidum complex is special by its members possessing highly similar morphological features which lead to serious taxonomic confusion (Adaskaveg and Gilbertson, 1988; Moncalvo et al., 1995a and 1995b).

Hence, morphological appearance alone is insufficient for species delimitation (Gottlibe et al, 1998). Adaskaveg and Gilbertson (1986) reported that various scientists determine the identity of Ganoderma species by host specificity, geographical distribution, Macromorphology and interfertility tests. In addition, the outer layer of the pileus had also been included for species identification (Adaskaveg and Gilbertson, 1988) [11]

Morphological variations:

Macromorphology:

Pileus: The pileus consist of context, cutis and tube, different colors, such as yellowish-white, light brown, yellowish-brown, brown, reddish-brown, dark brown, puce and black, and different shapes, for example flabelliform, suborbicular, cochlear, reniform, hippocrepiform and other irregular shapes. There are also differences in the size of the pileus. In addition, others such as laccate or nonacute, with radial furrows or with concentrically sulcate zones, are also important criteria of identification

Context:The context is the subcutaneous part of the cutis. The color of the context varies, for example pale white, white, yellowish-brown, dark brown, cinnamon. Context usually has one layer or several layers. Some species have one or more chitin lines in context, producing gasterospore sometimes in the context.

Pore surface:The pore surface is initially white or cream-coloured, becoming yellowish-brown, dark brown or puce when mature.

Tube: The tube is composed of hyphae, producing basidiospores. The colour of the tube is yellowish-brown, brown, dark brown or puce. Tubes exist layer by layer; the length and the thickness of the tube are also important characteristics.

Stipe: The stipe is composed of hyphae and generally divided into sessile and substipitate to stipitate based on the presence or absence of the stipe. Attachment type of the stipe on pileus are varied from lateral to nearly central. Additional shape, length, diameter, colour and laccate or nonlaccate are often of value in taxonomy.

Micromorphology:

Hyphal system: The hyphal system includes monomitic, dimic and trimitic. Most species in the genus Ganoderma are trimitic, including generative hyphae, skeletal hyphae and binding hyphae. Generally, generative hyphae are hyaline, thin-walled, with clamp connections. Skeletal hyphae are darker than generative hyphae, yellowish-brown, thick-walled to solid. Binding hyphae are hyaline, branched, thick-walled to solid.**Basidia:** The basidia are near hyaline, thin-walled, short and strong, spherical to clavate, producing four sterigmata each basidium. **Basidiospores:** The basidiospores are double-

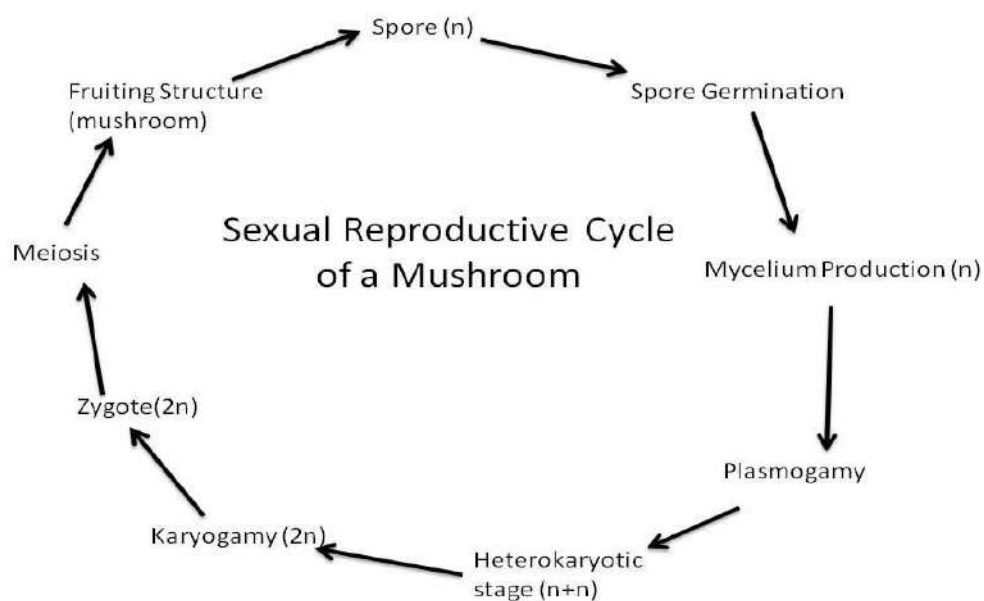
walled; walls are externally colourless, internally dark brown. Basidiospores are ovoid to oblong, truncate or not at the apex. The length-width ratio of double walls and the surface structures are all the stable characters. Cutis: The cutis has types of amauroderm, hymenoderm, plecoderm, trichoderm and characoderm. The shape, colour, length and weather thickness at the top of the cutis have obvious morphological differences in identification of species. Gasterospores: The gasterospores are spherical or fusiform, thick-walled in asexual morph, which exist in the context and tube [10].

Macroscopic and microscopic structure:

The *Ganoderma lucidum* complex is characterized by its woody basidiomes, each of which has a shining substance resembling sealing wax. This special coating is termed laccate. Parallel concentric rings present on the surface of the basidiome. A basidiome may be reddish brown, purplish brown or black in colour depending on species. The basidiome is usually dimidiate (shelf-like) or bracket-like, stipitate (with stalk) or sessile (without stalk). However, color and form of the pileus were subjected to environmental variations. Context color varied from white to brown and changed significantly in dried specimens. The tubes at the bottom of the basidiomes are cylindrical and long. The stipe usually possesses the same or darker color than the pileus. Size varies from 5 to 20 cm in diameter. Basidiomes may be solitary or imbricate. Sometimes branched stipes each carrying a circular pileus may be found. The hyphal system is usually trimitic (consists of 3 different types of hyphae) but dimitic is (2 different types of hyphae present) also found. Generative hyphae are branched, thin-walled, simple septate or clamped. It is the basic element of the tissue of a basidiome. Binding hyphae are highly branched, thick-walled and without septa. Skeletal hyphae are unbranched, thick-walled and without septa. The hymenium (a layer of cells) lines each pore. Within a mature hymenium, basidia can be found. On the other hand, a palisade of clavate cells (sterile basidia) will form sterile hymenium. A basidium bears four basidiospores by sterigmata (spore-bearing extension of basidium). The spores are discharged forcibly. Spores are reddish brown with measurements varying from 9-12 x 5.5-8 μm . This fungus grows annually and most of the basidiomes only emerge in summer. Active growing regions are white in colour and are usually found at the margin of the basidiome. The growth pattern is mainly concentric. When it matures (characterized by the diminishing offsite margin on the basidiome), basidiospores will be released. In field studies, many of these discarded basidiospores fall on the surface of the pileus and leave a brown powdery appearance. At this stage, the specific odor of the *Ganoderma lucidum* complex can be detected (Zhao and Zhang, 1992) basidiomes are usually found on stumps or near soil surface or arising from buried roots. The fungus likes to grow in habitats with indirect sunlight, high humidity and temperature (Zhao, 1989). This fungus is commonly found in sub-tropical regions.[11]

Reproducton:

In the summer and fall the fruting bodies or mushroom of *G. lucidum* release millions of spores into the air. These spores get blown into new places and if the conditions are suitable, the spore is able to germinate and a primary hypha gets formed. This new primary hypha must find a mate to continue in the growth cycle. This process is comparable to a sperm and egg fusing into a more complet organism, although the nuclei of fungi do not fuse as they would in animal fertilization. Instead, this process is called plasmogamy, meaning that the cytoplasm fuse together. The fungus is now in a dikaryon state. The fungus cannot produce secondary hypha produces a very strong decomposing chemical called hydrolase to help break down wood. As long as the wood source is sufficient, the secondary hypha can continue to grow for many years. These hyphae can branch out in order to increase surface area for nutrient uptake. All of these hyphae combine together are known as mycelium.



When conditions finally become unsuitable for optimal growth; the fungus must produce a fruiting body to release sexual spores that can be spread to more favorable conditions. These fruiting bodies, more commonly known as mushrooms, produce basidium. It is in these club shaped structure that the nuclei finally combine in the process called karyogamy. Then through the process of meiosis, the diploid cells are broken down into four haploid spores. These spores get release from the basidium when this process is complete. In *G. lucidum*, the basidium are found on the underside of the fruiting body. The topside is normally a tougher structure and is not responsible for releasing any spores. Once these spores are release into the air, cycle can begin again. It should be noted that *G. lucidum*

can come in many different colors. *G. lucidum* also known as Rishi in Japanese cultures can come in shades of red, purple, white, blue, yellow and black. Typically, young mushrooms show shades of white and yellow as they are developing. Another interesting fact is that the fruiting body can also come in a variety of forms. One is the typical mushroom, Where the very top or cap is a semicircle with a thinner stem leading up to it. Another form is called conk or shelf mushroom. This kidney shaped mushroom is what is typically found growing on the sides of dead trees.

Life cycle:

Sharing the similar life history as Basidiomycota, *Ganoderma* species tend to have mutually indistinguishable, compatible haploids which are usually mycelia being composed of filamentous hyphae. Typically, haploid mycelia fuse via plasmogamy and then the compatible nuclei migrate into each other's mycelia and pair up with the resident nuclei. Karyogamy is delayed, so that the compatible nuclei remain in pairs, called a dikaryon. The hyphae are then said to be dikaryotic. Conversely, the haploid mycelia are called monokaryons. The dikaryons can be long-lived, lasting years, decades or centuries. The monokaryons are neither male nor female. This results in the fact that following meiosis, the resulting haploid basidiospores and resultant monokaryons have nuclei that are compatible with their sister basidiospores (and their resultant monokaryons) because the mating genes must differ for them to be compatible. The sexual system of some *Ganoderma* species has been shown to be tetrapolar (i.e., these species have different mating type alleles at two unlinked loci) and heterothallic [85, 106, 107]. The maintenance of the dikaryotic status in dikaryons is facilitated by the formation of clamp connections that physically appear to help coordinate and re-establish pairs of compatible nuclei following synchronous mitotic nuclear divisions. In a life cycle the long-lasting dikaryons periodically (seasonally or occasionally) produce basidia, the specialised usually club-shaped end cells, in which a pair of compatible nuclei fuse (karyogamy) to form a diploid cell. Meiosis follows shortly with the production of four haploid nuclei that migrate into four external, usually apical basidiospores. Typically, the basidiospores are ballistic; hence, they are sometimes also called ballistospores. In most species, the basidiospores disperse and each can start a new haploid mycelium, continuing the life cycle. Basidia are microscopic but they are often produced on or in multicelled large fructifications called basidiocarps or basidiomes, or fruit bodies. Ballistic basidiospores are formed on sterigmata which are tapered spine-like projections on basidia and are typically curved, like the horns of a bull. In summary, meiosis takes place in a diploid basidium. Each one of the four haploid nuclei migrate into its own basidiospore. The basidiospores are ballistically discharged and start new haploid mycelia called monokaryons. There are no males or females; rather there are compatible thalli with multiple compatibility factors. Plasmogamy between compatible individuals leads to delayed karyogamy leading to establishment of a dikaryon. The dikaryon is long lasting but ultimately gives rise to either fruit bodies with basidia or directly to

basidia without fruit bodies. The paired dikaryon in the basidium fuse (i.e., karyogamy takes place). The diploid basidium begins the cycle again [10].

III. Industrial importance of ganoderma:

Medicated food and dietary supplement:

Since the earliest times, mushrooms have been treated as a special food. They have been widely consumed not only for their taste, texture, and nutritious composition, but also for their claimed therapeutic value. The practice of using fungi as medicines is found in the traditions of many cultures, past and present.[7]The total number of publications on Ganoderma in the world has exceeded 10,000 with 7,000 related patents. Over 1,000 Ganoderma health food products are certified by Chinese government. Ganoderma lucidum is used as the material of functional food in daily life such as soup, tea, wine and yoghurt. This species is used with ginseng (*Panax ginseng*) to make soups. These soups are useful for soothing the nerves, relieving asthma, and strengthening the immune system. Ganoderma lucidum is mixed with sanqi (*Panax notoginseng*) to make herbal Sanqi wine which helps to promote blood circulation and soothe nerves. Ganoderma lucidum alone or combined with other herbs such as Chinese yam (*Dioscorea opposita*), magnolia berry (*Schisandra chinensis*), and desert-broomrape (*Cistanche deserticola*) can be used in herbal wine for balancing the body and anti-aging process. Tea is prepared by *G. lucidum* alone or mixed with other herbs such as Japanese honeysuckle (*Lonicera japonica*), Chinese hawberry (*Crataegus pinnatifida*) and wolfberry (*Lycium barbarum*) which helps in modulating immunity to keep the body in balance [1]. Regular consumption of Ganoderma is believed to preserve human vitality and to promote longevity. The dried powder is currently used worldwide in the form of dietary supplement.[3]Millions of people take it every day to enhance their energy, to improve their digestion, and to sleep better. Lingzhi is used also both for the prevention and for the treatment of a number of health problems that require a balanced immunoresponse system and also a healthy cardiovascular system. Lingzhi-based products have attracted a great deal of attention during the last 20 years not only in some Asian countries but also in North America and Europe, and they are generally divided into three types of products [9].

Ganoderma as health foods:

In addition to its usefulness as medicines, Ganoderma is formulated in numerous health foods (functional foods or nutraceuticals or dietary supplements) for improving human health and promote longevity. According to Chinn NMPA's website, there are 1233 Ganoderma-containing products currently on file, including 1215 domestically made and 18 imported products. They are in the form as capsules, tablets. Granules.oral liquid. tea bags. paste. vina. etc. The manufacturing process usually includes extraction of Ganoderma fruiting bodies or spores by water or alcohol after crushing and grinding of raw materials, then concentration and drying, and then made into various forms of

Ganoderma health products according to designed formulations. Legally, each Ganoderma health food product, before sold on the market, must be successfully registered with Chinese government and has to specify the daily intake dosage and amount of active ingredients such as triterpenoids, polysaccharides, and oleic acid. In this regard, Ganoderma health food products have clearer, more objective, and measurable indicators, and thus their product quality can be guaranteed. Among these health food products, capsule is the most common and simplest preparation. Approximately 70% of Ganoderma health products were made into capsules, followed by granules and tablets. Common raw materials for making Ganoderma health products are fruit body extract, fruit body fine powder, mycelia, spores, and spore oil. They are formulated either individually or in combination with other bioactive natural products. Analysis of these Ganoderma health food's compositions showed that products of Ganoderma only, with one, two, three, or four and more other raw materials, account for 43.5%, 23.0%, 7.5%, 15.5%, and 10.5% of the Ganoderma health products, respectively. Ganoderma extract is one of the most frequently used components in health food. China NMPA allows health foods to legally claim 27 functions, and Ganoderma extract containing health foods generally claim functions including immunity enhancement, insomnia improvement, auxiliary protection against chemical-induced liver injury and radiation-caused damage, fatigue alleviation, auxiliary lowering of blood lipid and blood glucose and etc. Ganoderma extract is usually formulated with Ganoderma spores, ginseng, other herbs, even black rice powder, etc. In general, the formulation rule for designing herb-based health food or compound medicines is Monarch-Minister-Assistant-Guide (or pronounced *jū chē zuò shì* in Chinese), wherein monarch is the component targeting a main symptom, minister is the component helping monarch's function, assistant working secondary symptoms, and guide leading the monarch, minister, and assistant to where the symptoms (or causes) are or modulating the side effect caused by the monarch, minister, and assistant.[10]

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intent to derive important health benefits. An estimated one hundred millions of Americans spend more than \$28 billion on dietary supplements every year¹. However, under Dietary Supplements Health and Education Act of 1994 (DSHEA), quality of dietary supplements is not evaluated by the U.S. Food and Drug Administration (FDA) ^{1, 2}. Both industry and FDA acknowledge that many products have been introduced into the market without any safety assessment¹. Alarming, hundreds of products marketed as supplements have been found spiked with illicit substances not listed on the products' labels, risking serious injury or even death³. Indeed, within the first three months of 2015, FDA warned about or recalled over 30 tainted sexual enhancement products containing prescription erectile-dysfunction drugs or related synthetic analogues⁴. In February 2015, the New York State Attorney General compelled major retailers – Walgreens, Walmart, Target, and GNC – to halt sales of certain herbal supplements, after deoxyribonucleic acid (DNA) barcoding results failed to detect DNA from the botanical materials listed on the label of ~80% tested products⁵. Though the absence of DNA might be an artifact caused by its destruction during the manufacturing process, it still triggered a great concern on the quality of dietary supplements in the United States. Usually, chemical characters of herbal supplements are more stable than their DNA sequences during different manufacturing processes. Therefore, taking chemical insights into the quality of herbal/mushroom supplements should be more reasonable.[12].

Pharmaceutical industry:

Although Chinese medicines have long been used clinically, in most cases the chemical basis for their therapeutic action has not been understood. It is widely held that the pharmacological effect of Lingzhi depends on its color. Actually, Lingzhi is not a single medicine but possesses different properties depending on the stage and species of Ganoderma and the environment in which it has grown. In the past few decades, scientists have conducted extensive research to explore further and possibly exploit the claimed therapeutic effects of Ganoderma. Over 100 reports have been published concerning the chemical constituents of *G. lucidum* and the physiologically active new compounds isolated from its fruit body and mycelium with the help of chromatography, spectrochemistry, and bioassay systems.[7]

Antitumor action:

High-molecular-weight polysaccharides from the cell walls of fungi have been found to stimulate both nonspecific host resistance and specific immunological reactivity and to exert inhibitory effects against transplantable tumors [Badger, 1984]. Much of this experimental work has relied on a bioassay system that normally uses sarcoma 180 in mice based on an allogeneic, tumor-graft rejection mechanism [Whistler et al., 1976]. The polysaccharides of Ganoderma comprise one of the major sources of its physiologically active compounds and are extracted from the dried fruit body or

separated from the broth of a shaking liquid culture. Analysis of the purified polysaccharide utilizes acid hydrolysis to determine monosaccharide constitution, enzyme hydrolysis to detect anomeric structure, methylation and Smith degradation to elucidate linkage type, and gas chromatography or mass spectrometry with NMR information to ascertain structure [Mizuno and Hazama, 1986].

The molecular weight of the polysaccharide is indefinite, but generally ranges from 4×10^5 to 1×10^6 in the primary structure (Su, 1991), SO it is usually described in terms of the repeat unit.[7]. Ganoderma polysaccharides and Ganoderma triterpenoids possessed anti-tumor and immunomodulatory effects [13]

Complement inhibition effect:

Min et al. [83] reported that gadoteridol F, ganodermanondiol, ganodermanontriol from spores of *G. lucidum* exhibited strong anti-complement activity, through which these substances can affect the humoral immune system in the host defense.[5]

Proteins synthesis, nucleic acid synthesis enhancer:

Administration of polysaccharide D, from the fruit body of *G. lucidum* was found to increase serum, liver, and bone marrow protein synthesis in mice (Guan and Cong, 1982). D, also enhanced the incorporation of labeled uridine into liver RNA but not labeled thymidine into liver DNA. In contrast, treatment with the polysaccharide increased both RNA and DNA formation in the bone marrow where B cells are manufactured. The action of the polysaccharide D, lends support to the material basis for the multiple pharmacological activities attributed to *Ganoderma*. [7]

Anti diabetic agent from *G. lucidum*:

Protein tyrosine phosphatase 1B is a promising therapeutic target in diabetes, and it plays an important role in the negative regulation of insulin receptor signaling and decrease expression of insulin receptor beta subunit [8]. In subsequent studies, streptozotocin induced diabetes in rats was given water alcoholic extract of *G. lucidum* at 1mg./kg for 30 days. After this time, blood sugar level dropped from 456mg/dL to 265 mg/dL [14].

Regulation of intestinal flora:

Recently, the effect of polysaccharide on intestinal flora has been paid more and more attentions. Polysaccharides from the mycelia of *G. lucidum* (GLP) can improve intestinal barrier function, regulate intestinal immunity, and modulate intestinal microbiota. Different metabolites associated with the improvement of intestinal immunological function and the regulations of intestinal microbiota were also identified. The results provided a potential metabolomic mechanism of health-beneficial properties of polysaccharides from the mycelia of *G. lucidum*, which might be used as

functional agents to regulate the intestinal functions [10]. The polysaccharides from *G. lucidum* strain S3 GLPS3 markedly alleviated the pancreatitis in mice through decreasing lipase, AMS, IFN- γ , and TNF- α level as well as increasing SOD and total antioxidant activity. Furthermore, GLPS3 altered the composition and diversity of intestinal microbiota, especially, decreased the relative abundance of phylum Bacteroidetes, and increased the relative abundance of phylum Firmicutes. At the genus level, supplementation of GLPS3 increased the relative abundance of the beneficial bacteria such as *Lactobacillus*'s, *Roseburia*, and *Lachnospiracea* [10].

Nervoussystem regulation:

Since tonics in general may increase nonspecific body resistance, the results of Liu et al. (1979a) imply that the regulatory action of *Ganoderma* on the nervous system and liver function (considered in the next section) may contribute to the increase of nonspecific resistance. These investigators conducted pharmalogical studies on mice using the spores of *G. lucidum* and the mycelium of *G. capense* produced by submerged fermentation. Their results indicated the alcohol-water-soluble extracts of the spores and mycelium acted on the central nervous system and were essentially similar. The extracts decreased spontaneous motor activity in mice, prolonged barbital sleeping time, prevented nicotine-induced convulsions, and inhibited pilocarpine- induced salivary secretion. Both preparations also had anticholinergic action. Kasahara and Hikino (1987) found that extracts of *G. lucidum* show an analgesic activity in mice. The adenosine isolated from the fruitbody inhibited central inhibitory-reduced spontaneous motor activity, elevated pain threshold, prolonged the death time induced by caffeine, and relaxed skeletal muscle in mice.

Liver-protection and detoxic antactions:

An alcohol-ether-soluble fraction from the mycelium of *G. capense* produced by submerged fermentation has been shown to protect the liver and enhance its detoxifying function. The fraction lowered the serum transaminase levels induced by CCl₄, promoted the regeneration of the liver in partially hepatectomized mice, and increased the resistance of mice to the toxicity of indomethacin and digitoxin. It also decreased accumulation of triglycerides. The action of a spore extract from *G. lucidum* was similar but weaker. Yu et al. (1981) examined the chemical constituents of the deep-layer fermentation mycelia of *G. capense*. Four furan derivatives and one water-soluble component, identified as nicotinic acid, were isolated from the mycelium, while the major fatty acids were palmitic, linoleic, and linolenic acids. detected uridine, uracil, adenosine, and adenine in the submerged culture of *G. capense*. Using galactosamine-induced cytotoxicity in primary-cultured rat hepatocytes, Hirotsani et al. (1986) observed that ganoderic acids R and S are strongly antihepatotoxic. Byun and Kim (1987) investigated the administration of *G. lucidum* extract and the free radical-scavenging amino acid glutathione in limiting liver damage induced by CCl₄, in rats as indicated by

blood transaminase levels, lipid peroxidation values, and histological findings. They found that concurrent administration of the extract and the acids was more effective than either one alone, particularly against liver necrosis and hepatitis.

Respiratory system action:

Chen (1986) reported that, in albino rats with experimentally induced chronic bronchitis, daily intragastric doses of a concentrated solution containing the mycelia of *G. lucidum* induced a regeneration of the bronchial epithelium. In addition, intraperitoneal injection of the alcohol extract of the mycelium or the aqueous extract of *G. lucidum* had significant antitussive and expectorant actions on induced cough.

Muscular dystrophy studies:

Yu and Zhai (1979) used five compounds isolated from the water-soluble portion of the mycelium of *G. capense* in the treatment of progressive muscular dystrophy, atrophic myotonia, and certain other related diseases with encouraging results. The compounds were identified as adenine, adenosine, uracil, uridine, and D-mannitol. Animal experiments showed that uracil and uridine are capable of lowering the elevated serum aldolase level of mice with experimental myotonia. Hyperaldolaseemia has been detected in both progressive muscular dystrophic and hereditary muscular dystrophic animals. The herbicide 2,4-dichlorophenoxyacetic acid (2,4-D) has been used for producing experimental myotonia in animals. Raised the aldolase level in mice with 2,4-D and found that *G. capense* and *Japonicum* preparations given intraperitoneally could lower the elevated levels. Uracil and uridine isolated from *G. capense* mycelium showed the same effect. Zhang (1980) also found uracil and uridine isolated from *G. capense* effective for impeding the elevation of serum aldolase. Apparently, these two compounds are the active principles of *G. capense* used in the treatment of muscular dystrophy.

Radiation protection:

Nucleated bone marrow cells of mice can be protected against effect of radiation-induced micronucleus formation with the polysaccharides extracted from *Ganoderma*. The efficacy of the radioprotection was comparable to that of L-cysteine. Where acute radiation sickness in mice was induced by a lethal dose of ^{60}Co , administration of a *Ganoderma* preparation, given intragastrically for 20 days before irradiation and 20 days after, significantly reduced animal mortality. Post irradiation application alone did not change the lethal action of ^{60}Co , but it did prolong survival time.

Toxicity experiments:

Various preparations of *G. lucidum* reported by Chen (1986) were shown to have a very low toxicity in experiments with mice, rabbits and dogs, and rats. At high doses, the rabbits and dogs became inactive, but no abnormalities were discovered in pathological examinations. Administration to young rats did not affect the growth and development of the animals or produce any abnormalities in liver function, electrocardiogram and major organs.

Patented products and processes:

Patents contain the most complete and detailed information on the compounds with medicinal effects which have been extracted from *Ganoderma*.

Antitumor preparations:

Many patents have been issued for antitumor products. An anti-carcinogen has been obtained from the hot-water extracts of *G. boninense* *G. tsugae* mycelia (Kureha Chem. Ind. Co., 1976). The effective polysaccharides had molecular weights of 1×10^5 and contained 63% glucose, 12% galactose, 13% mannose, and 12% xylose. A similar patent was issued for antitumor polysaccharides and their production from an extract of, or the cultured broth of the mycelium of, various basidiomycetes, including *G. tsugae*. Two products effective against sarcoma 180 in mice are an antitumor agent isolated from *Ganoderma* and an antitumor polysaccharide from *G. applanatum*. In the latter, the glucans were characterized as β -1, 3-glucosides in chain with one P-1, 6-glucoside linkage for every 12 glucose units. A P-glucan ganoderan from the cultivation of *Ganoderma* hyphae is not only anticarcinogenic but also hypoglycemic, hypocholesteremic and useful as a food thickener, binder, and dough conditioner as well. Hybrid cells with antioncotic activity were obtained by the fusion of *Ganoderma lucidum* with *Pleurotus ostreatus*, *Lentinus edodes*, or *Grifola frondosa*. A medium has been developed for use in the production of germanium-containing basidiomycetes mycelia, including that of *Ganoderma*, that are effective as cytostatic. A composition which contains *G. lucidum* is active against ascites tumors.

Liver function stimulants:

Ganodosterone and ganoderic acids isolated from *G. lucidum* have been used as liver function stimulants. A fermentation product containing P-D-glucan, saponins, and ergosterol derived from culture medium containing *Ganoderma*, cereals (or potatoes), and beans is a food or beverage additive which has shown significant therapeutic value for patients with liver failure .

Hypotensive preparations:

An antihypertensive agent has been extracted from *G. lucidum* fruitbodies. Biologically active compounds from *G. lucidum* with antiallergic or hypotensive activity have also been obtained from mycelium grown in a solid bag. An extract from *G. lucidum* used in a food is capable of suppressing arachidonic acid formation and normalizing elevated blood viscosity. Extracts of *Ganoderma* have been utilized in a preparation with thrombolytic activity to treat thrombosis and hypertension. A preparation of *G. lucidum* powder rich in ganoderic acids has been found to inhibit formation of peroxy lipid and angiotensin-converting enzyme. A nonbitter *Ganoderma* extract powder has also been used for treatment of hypertension and hyperlipemia. Lanostane derivatives from *G. lucidum* are antihypertensive in spontaneously hypertensive rats.

Hypocholesterolemic preparation:

The beta-glucan mentioned as an antitumor agent also has hypocholesteremic effects. A fermentation product containing P-D-glucan, saponins, and ergosterol that is derived from culture medium containing *Ganoderma* and is effective a liver function stimulant, is also anticholesteremic.

Hypoglycemic preparations:

A product isolated from *G. lucidum* that contains ganoderan A and B has demonstrated hypoglycemic activities in mice. The p-glucan cited as an antitumor agent is also hypoglycemic.

Chronic bronchitis treatment:

A tasteless and nonbitter extract for the treatment of chronic bronchitis is obtained from *Ganoderma* by extraction with an organic solvent.

Immunomodulatory agent:

A glycoprotein derived from *G. lucidum* mycelia acts as an immune suppressive agent in the treatment of allergic diseases and cell-mediated immune disease, while a protein derived from the mycelium of *Ganoderma* also shows immunosuppressive activity. An anti-retrovirus drug containing the active ingredient LZ-8 has been derived from the mycelium of *Ganoderma*. The agent is composed of mannose, galactose, and hexosamine; does not coagulate human erythrocytes; has immunosuppressive activity; and is effective for disease therapy. A phagocyte-activator has been extracted from *Ganoderma* mycelium cultured in liquid medium.

Alzheimer's disease treatment:

A fermentation product, similar to the food or beverage additive containing. Lucidum that is effective in liver failure has been found to have a significant therapeutic effect on patients with Alzheimer's disease.

Antibiotic- bacteriolytic enzyme:

Fungal lysozyme and an acid protease have been produced from a variety of mushrooms, including G. lucidum.

Antimutagen:

An Antimutagen glycoprotein has been derived from basidiomycetes such as Ganoderma. The antimutagen inhibits the manifestation of teratogenicity caused by chemical or physical factors.

Skin preparation:

A melanin-inhibiting skin preparation containing kojic acid and pharmaceutical natural products includes G. lucidum.

Hair tonics:

Hair-growing material combines a Ganoderma extract with an extract of a Japanese horseradish, wasabi. This material effectively accelerates the growth of hair by providing a nutritive substance to the hair roots. Six patents for hair tonics contain an extract from Ganoderma in combination with other ingredients. One blends chlormadinone acetate and at least one compound selected from a group of agents, including G. lucidum, which accelerates blood circulation and/or stimulates hair follicles. The second contains spironolactone: the third, cyproterone acetate: the fourth, a dithiolane-3-pentanoic acid derivative; the fifth, γ -amino-P-hydroxybutyric acid, benzyl nicotinic acid, and/or vitamin E nicotinate: the sixth, cimetidine. Some of the combinations prevent dandruff as well.

Bath preparation:

A bath preparation contains polysaccharides, polypeptides, and thiamine from mushrooms. *Applanatum* and G. lucidum are grown and freeze-dried for use in the preparation.

Beverages:

A sake drink has been manufactured using a Ganoderma-flavored or Ganoderma-containing extract. Cholane steroids isolated from G. lucidum are used as hop flavor substitutes in beer and other food additives [10].

Pathogenicity of mushroom ganoderma:

Ganoderma lucidum is a white rot fungus which causes simultaneous decay with preferential removal of lignin. *Ganoderma* spp. are pathogenic and soil borne fungi which colonize many living or dead woody plants, causing root and basal stem rot. It attacks a number of plants such as coconuts and oil palms, oak, maple, sycamore and ash, mesquite, olive, grape and conifers subabool {*Leucaena leucocephala*} and monocotyledonous species. Once a basidiome emerges, living tree will die after few years with progressive desiccation of leaves from the oldest to the youngest. In laboratory studies, *G. boninense* was reported to cause 100% infection to oil palm seedlings. This indicates that this *Ganoderma* species may be a strong pathogen [11]

Decline and dieback of SISSO:

Generally, a decline in sissou is attributed to the decrease in development, maturation, power and vigor of the plant, whereas complete destruction of the tree crown is considered as dieback. Fungal pathogens including *Fusarium solani*, *Fusarium oxysporum*, *Phytophthora cinnamomic*, *Curvularia lunata*, *Ganoderma lucidum* and *Rhizoctonia solani* are recognized as causative pathogens for rapid decline and death of sissou. detected ten fungi from different parts of the sissou tree; and by inoculation they observed that *F. solani* causes higher infections (75%) compared to other fungi. Similarly, Shakya and Lakhey (2007) also confirmed *F. solani* to be the causal agent for dieback of sissou in a lab experiment on diseased host samples collected from different parts of Nepal. Sissou is under critical risk of dieback disease for last few decades in Pakistan, India, Bangladesh and Nepal and disease is affecting millions of sissou trees in these countries. This disease has been a serious threat to sissou forest and timber production activities in India, Nepal, Pakistan, Bangladesh and Afghanistan since 1993. Wilting is the common symptom of decline and dieback (first observed in natural and plantation forest in Uttar Pradesh, India). Wilting takes place when the vessels of a tree get plugged by fungal (*F. solani*) hypha; About 80% of sissou trees in Punjab of Pakistan were reported to be suffering from wilting along the canal bank and roadside areas; however, the trees growing in the agricultural and well-managed lands were less disturbed by wilt and dieback disease. Both biotic and abiotic stress agents are responsible for the dieback disease hampering the natural physiological activities of plants, among which insects and pathogens are biotic stress agents while extreme temperature, drought, and waterlogging conditions are abiotic stress agents. The sissou tree weakened by *solani* finally dies due to further stresses from the environment and other biotic factor. Various secondary factors including insects (termites), fungi (phytophthora), livestock (causing girdling on the tree), human activities (pruning, herbicide spray drift, etc.), and climate change are responsible for the dieback of sissou. Besides sissou dieback is also found to be associated with the tree age, bacteria, and viruses. Acharya and Subedi (2000) conducted a field survey from 28th March to 19th April 2000 to quantify the degree of damages caused by dieback in sissou in the western

region of Nepal where they recorded mortality of over-matured dieback-affected sissoo trees in a short period of time performed 16S rDNA sequence analysis¹ of trees suffering from dieback and found bacteria as a causative agent of dieback disease. They found *Pseudomonas* bacteria in the samples of severely affected sissoo tree. Recording presence of double stranded RNA and other viral particles in leaf samples of sissoo trees infected with dieback, concluded that dieback is caused by viruses too [15].

Symptoms in dieback of SISSOO:

Some common symptoms of dieback disease of sissoo trees are dried leaves and branches, alteration in color and wilting of the crown, which finally leads to death of the tree. Dieback infected trees also bear the reduced leaf size, lesioned stem (producing gum), change in leaf color (dark green to light green or yellow) and, finally, the entire tree gets defoliated leaving the branches leafless and desiccated from apex to base. Pathogens causing dieback are mostly found in roots of sissoo but sometimes in trunk bases too. Symptoms first appear in the crown of the tree and then move downwards, leading to a stag headed condition in the severe stage [15].

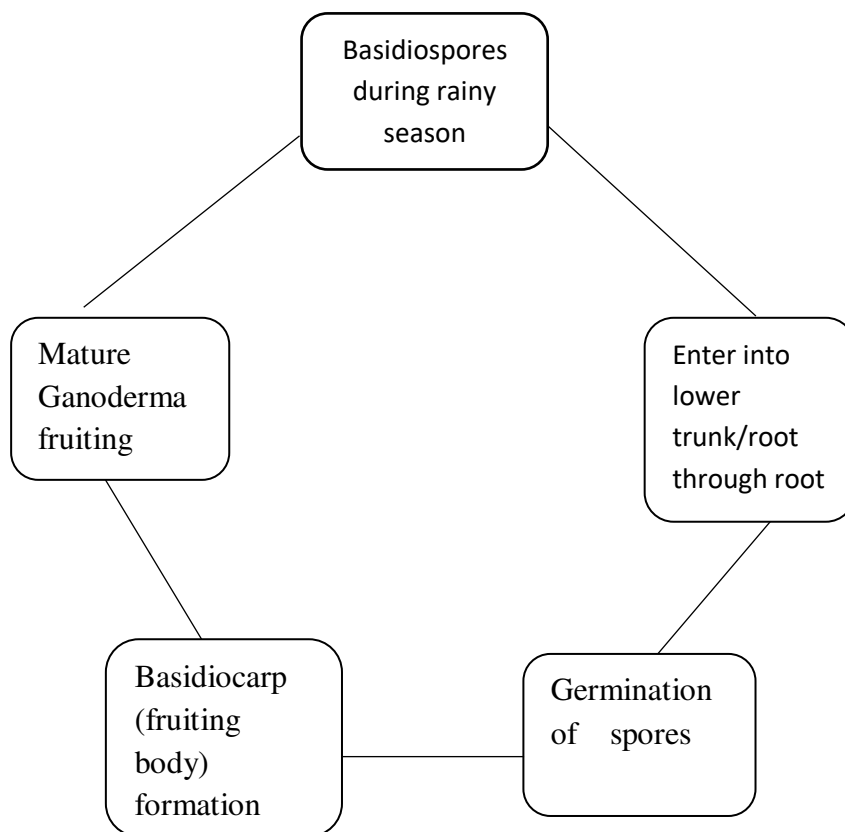
Management of SOLANI (fungus causing dieback in SISSOO):

Billions of sissoo trees have been rendered useless in different parts of South Asia until now due to the dieback and decline disease; still, the practical solution is unavailable. The mitigation approaches adopted for this disease are slightly different in various regions of South Asia with more focus on control measures rather than the preventive measures. However, the awareness generating seminars for the local people besides the technical interventions to control the disease are producing positive results in Pakistan. For any type of disease control, information on the history of disease, frequency of epidemic, prevalent pathogens, resistant host varieties, locality factors, accessibility of labour, and cost would be beneficial before carrying out the intended management activity. Studies reveal that *F. solani* could be controlled both biologically and chemically. Studies show *Trichoderma* species to be effective against the growth of *F. solani* due to the production of both antibiotics and extracellular lytic enzymes working against the fungal development. *Trichoderma harzianum* releases chitinolytic enzymes that control the development of various pathogenic fungi. Further, chitinolytic enzymes produce volatiles that suppress the growth of fungal species and cause vacuolation of its cell, followed by the breakdown of fungal hyphae. The biological control measures alone might not be the sole solution for this pathogen, where it demands the introduction of chemical inhibitors. In most of the cases in Nepal, studies show the frequent use of Bordeaux mixture (50% lime + 50% copper sulphate) paste. 16S rDNA sequence analysis is a broadly used technique for the identification of bacteria. To overcome *F. solani* in India, different kinds of fungicides, namely Antracol, Copper Oxychloride, Ridomil Gold, Dithane M-45, Alliete and Topsin-M, were tested against *F. solani* in varying

concentrations. Dithane M-45 and Ridomil Gold were most effective against *F. solani* whereas Topsin-M and Alliete showed partial results. Antracol and Copper oxychloride were least efficient in retardation of fungal growth. Similarly, in another study, Ridomil Gold, Dithane M-45, Captan, Bayleton and Benomyl exhibited higher effectiveness against the mycelia growth of *F. solani* in-vitro. In contrast, Alliete showed minimal influence against this fungus, while Benomyl was useful in-vivo only. Further, Dennis and Webster (1971) suggested that Carbendazim and Captan have the inhibitory effect on the mycelial growth of *F. solani*. Moreover, Ahmad et al. (1996) reported Vitavax, Bavistin, Dithane M-45 and Benlate to be capable of retarding the growth of mycelia in *F. solani*. Injecting Methyl-2benzimidazol carbamate (MBC) (a precipitate) toxicant (derived from benomyl fungicide) is also believed to be effective against sissoo wilting due to its firmness and strength. Although several chemicals have been tested against *F. solani*, Idrees et al. (2006) claimed no cure for it when the disease prevalence exceeds 25% in his experiment, which used Topsin-M and Dithane along with other chemicals in Pakistan for the control of sissoo dieback disease. The results from the experiments infer the toughness to cease or overturn the advancement of the disease once the symptoms of dieback are onset.[15]

Ganoderma root rot in SISSOO:

Ganoderma root rot in sissoo is caused by the fungus *Ganoderma lucidum* (division Basidiomycota). *G. lucidum* attacks both natural and plantation sissoo forest spreading quickly on light-textured soil as compared to heavy textured; therefore, the trees are swiftly killed in such sites. Once the tree is infected with this fungus, it attacks the cambium of the tree and interferes with the nutrient and water supply, eventually leading the tree to death. Generally, *G. lucidum* infects broad and small-leaved trees in natural forest (Bakshi, Reddy and Singh, 1976) and sissoo is one of them. *G. lucidum* (Fr.) Karst. (Dadu chyau in Nepali) has been documented from different parts of Nepal on various substrates like rotten trunks (from Bakhri kharka, north of Pokhara) tree trunks (from Lele, Kathmandu) and trunk of *Rhododendron arboretum* and *Quercus* species (from Manichur, Kathmandu)). In early 1989, it was reported that *G. lucidum* was responsible for the mass-mortality (75% of total) of a ten-year-old sissoo plantation in Teekapur, Kailali District, Nepal. The general means of *Ganoderma* spore introduction in hosts and its life cycle is presented in figure 2.[15]



Life cycle of *G. lucidum* [15]

Signs and symptoms of *G. lucidum*:

The initial visible sign of infection is the formation of fruiting bodies (description provided in Table 3 and Figure 3), either single or in clusters, on the lower trunk and exposed root areas. However, the appearance of conks (shelf-like fruiting bodies around 14 inches or 35.6 cm wide) is the final sign after which the disease becomes irreversible. The basidiocarp (basidium (spore) bearing fruiting body) of *Ganoderma* is annual, hard, and brittle and appears in the rainy season. It is originated on a brown stalk, laterally stipitate, and can be observed in the collar or basal region of the tree. Its upper and lower surfaces are yellowish-brown and white, respectively, and produce a white mycelial mat in between bark and the wood of infected trees. In the sissoo tree, *G. lucidum* infects root through wounded surfaces, damages bark and causes white fibrous rot in the sapwood. This fungus spreads through root contact from tree to-tree, and symptoms start to appear from the third year of plantations (Bakshi et al., 1972). Followed by the infection, the whole tree becomes leafless, branches start dying, and ultimately the tree dies within a few years. Infected trees exhibit a stag-headed condition in the beginning and finally, root and butt rot right before the death. Yellowing of leaves, wilting, appearance of undesirable leaves, dead branches, and decay of sapwood are other symptoms of this fungal infection.[15]

Control measures of *G. lucidum*:

Similar to the biological control measures applied for *F. solani*, *Trichoderma* species themselves are the most effective biocontrol agents for *G. lucidum* reported so far because of their considerable potential on growth reduction of *G. lucidum* in vitro. Among the three species of *Trichoderma*, *T. viride*, *T. harzianum*, and *T. pseudoganglia* the maximum reduction of fungal growth was showed by *T. harzianum* (68.5%) followed by *T. viride* (65.7%) and *T. pseudoganglia*. In plantation, we can directly apply the fungus (available in market under different trade names) on the seed/seedling or in the soil. Control Measures of *G. lucidum* Similar to the biological control measures applied for *F. solani*, *Trichoderma* species themselves are the most effective biocontrol agents for *G. lucidum* reported so far because of their considerable potential on growth reduction of *G. lucidum* in vitro (Sri Lakshmi et al., 2001). Among the three species of *Trichoderma*, *T. viride*, *T. harzianum*, and *T. pseudokoningii* the maximum reduction of fungal growth was showed by *T. harzianum* (68.5%) followed by *T. viridae* (65.7%) and *T. pseudokoningii*. In plantation, we can directly apply the fungus (available in market under different trade names) on the seed/seedling or in the soil fungal growth control. The study also compared Bordeaux mixture with Bavistin and claimed to be equally efficient in reducing the growth of *G. lucidum*. Additionally, Bhattarai et al. (2020) also recommend the use of tridemorph containing fungicides to control the fungus.

Health management:

The management plan is designed based on the prevalent risk factors and host-pathogens biology. The plan comprises three fundamental working units. The overall management plan strongly emphasizes on the preemptive measures to avoid the disease incidence and later focuses on the implementation of control measures. Figure 4 summarizes the management plan of sissou in the form of a flow chart.

Premitive measures:

These measures are applied before the disease incidence takes place. They help to cope with the risk factors and prevent the disease outbreak. Given that the over-aged sissou trees are highly susceptible to the fungal attack their removal from the forest stand is highly recommended. The first step before the new plantation to prevent the disease should be the elimination of decayed wooden fragments and fungal fruiting bodies from the last plantation. Disinfecting the nursery beds with any fungicide before sowing sissou seeds and cuttings should be mandatory. Moreover, focusing on light-textured soil, better drainage conditions, deep planting and irrigation to develop a deep and healthy root system will make sissou trees less susceptible from *F. solani* and *G. lucidum* both. Growing disease-resistant trees is another simple and effective measure to discourage disease incidences. Among several ways of obtaining disease-resistant breeds, quality seeds from brsseeding seed orchards (BSOs) (stand grown to produce superior seeds) could be considered. Moreover, time to time consultation with the forest

department for acquiring improved seeds and seedlings with strict quarantine during their transport from one site to another will also aid in disease control. Besides, promoting mixed plantation of sissou with resistant varieties like *Acacia nilotica*, and *Morus* species should be encouraged since these species are widespread in Nepal. Since the high forest sissou trees are facing a severe risk of dieback in the South Asian subcontinent, the cultivators would benefit from adopting vegetative propagation (branch cutting) to mitigate this issue. Taking into account the fact that wounds in the plant body are the entry point for the fungi, silvicultural practices like pruning and thinning should be strictly followed as suggested by the forestry experts to prevent and treat the wound to discourage the entry of fungi.

Regular monitoring and survey of the signs and symptoms:

Monitoring is an intermediate step focused on the identification of disease and preventing its spread from the infected to healthy trees. Aim of this approach is to identify the disease as soon as possible from the disease signs and symptoms. During monitoring, observed wounds in roots and trunks should be sealed with rubber latex and grafting wax or treated with fungicides to prevent the fungal infection. The monitoring should be performed in a participative way between the locals and forest technicians, for the better identification of signs and symptoms. In case of unidentified signs and symptoms, fertilization and watering the trees (especially in private or accessible stands) enhance the concentration of the nutrients in soil that provides resistance power to the tree against the fungi. Use of farmyard manure (possessing antifungal characteristics) is highly recommended for fertilizing the soil.

Reactive measures:

This section deals with treatment of the disease to prevent further loss and spread. For treating a diseased tree, first, biological measures to avoid the side effects of chemicals in the environment and human health are recommended. In case the biological methods fail to perform, the adoption of chemical controls is justifiable. Analyzing the adopted control measures against *F. solani* and *G. lucidum*, test of *Trichoderma* species as a biological control measure is proposed in Nepal. In case of chemical control measures, wide varieties of chemicals have been experimented against *F. solani* so far, but their credibility for use in Nepalese context is uncertain. Still, observing the repetitive success of Dithane M-45, Ridomil gold and Captan in other countries, such chemicals for testing their effectiveness are recommended. However, use of Bordeaux mixture can be introduced as new control measure. Similarly, for *G. lucidum*, the fungicides, namely Bavistin, Calixin and Bordeaux mixture, have been observed promising. Furthermore, if the treatment and cure are not possible or none of the treatment methods is proving useful, then extraction and destruction of the diseased component is recommended. The Government of Nepal reported the implementation of one farmer strategy in

Nepal to remove dead and dying trees from the site, to inhibit the spread of *Fusarium* throughout the plantation. Still, the effectiveness of this strategy is unproven. However, the best idea is to remove the infected trees immediately after it starts showing the symptoms of dieback to prevent the further spread of *F. solani* and destroy the whole tree along with fruiting bodies to restrict the spread of *Ganoderma lucidum*. [15]

Ganoderma applanatum:

Common host: wide variety of land scope and forest trees including acacia, alder, ash, birch, carob, citrus, elm, eucalyptus, fir, magnolia, maple, mulberry, oak, Peruvian paper tree, pine, poplar, sweet gum, sycamore, tulip tree and willow.

Symptoms: The invades trees through wounds, kills the sapwood of some species, and causes white rot of the sapwood and heartwood in roots and trunks. Forms semicircular conks are brown, and the lower surface is white, but turns dark when scratched, hence the common name 'artist's conk'. Stalks are absent. Fungus can spread through natural roots grafting. Conks usually are found near ground level. Columns of decaying wood can extend as far as 15 feet above and below the conk. [16]

Ganoderma polychromum (g. Lucidum):

Common host: Acacia, apple, ash, birch, boxwood, cherry, citrus, birch, boxwood, cherry, citrus, elm, hackberry, sweet gum, black locust, honey locust, magnolia, maple, oak, olive, peach, Peruvian pepper tree, pine, poplar, redbud, spruce, and willow.

Symptoms: The fungus causes a white rot and can attack living trees, causing extensively decay of roots and the trunk. Can kill the host during a period of 3-5 years. On some trees, such as oaks and maples, the rate of decay is rapid. The red brown, annual conks are up to 14 inches wide and coated on top with a distinctive reddish varnish like crusts; they generally appear at base of the trunk during summer. Causes decline in hardwood trees. Environmental stress, such as drought and wounding, can predispose trees to infection from this fungus. [16]

Ganoderma on oil palm:

Fungi belonging to the Ascomycetes family can also decay wood, the species of fungi mostly responsible for developing complex wood rot diseases are Basidiomycetes and particularly the *Ganoderma* family (Khairuddin 1990; Rao 1990). Several different species of *Ganoderma* such as *Heterobasidion*, *Polyporus*, *Inonotus*, *Laetiporus*, *Phellinus*, *Chondrostereum*, *Peniophora*, *Lenzites*, *Pleurotus*, *Schizophyllum*, and *Trametes* are responsible for a wide range of wood rots in a variety of trees. In all, at least seventy-five different examples of *Ganoderma* have been collected from twenty-one separate locations in Malays alone. However, it is *Ganoderma boninense* which has been

identified as the major disease of oil-palm trees. *Ganoderma boninense* (*G. boninsense*) causes both basal stem rot (BSR) and upper stem rot (USR) and remains South East Asia's most devastating oil palm diseases with direct loss of the stand, reduced yield of diseased palms and the resultant requirement for earlier replanting. Once young palms show symptoms of the disease, they usually die within 1 or 2 years, while mature trees can survive for only another 3 or so year. Although it has been clearly identified as the main cause of the disease in oil palms, strategies for the early detection and control of *G. boninense* are still immature. The purpose of this paper is to outline the existing strategies, to evaluate their effectiveness and to suggest ways in which the spread of this destructive fungus might best be addressed [17].

Chemical compounds extracted from ganoderma:

In the past 35 years, chemical components have been separated from the fruiting bodies, sporophytes and mycelia of *Ganoderma* including triterpenoids, meroterpenoids, sesquiterpenoids, steroids, alkaloids, polysaccharide, volatile oils and other types. Clinical studies have been confirmed that triterpenoids and polysaccharides have a good effect. According to the Chinese Pharmacopoeia, the dry fruiting body of *Ganoderma*, polysaccharides shall not be less than 0.90%, and the triterpenoids not be less than 0.50%. [2]. Polysaccharides and triterpenes have been most thoroughly investigated from *G. lucidum* and related species. However, sterols, lectins, and proteins have also been described. [3] secondary metabolites isolated from *Ganoderma* and their biological significance. Phytochemical studies over the last 40 years led to the isolation of 431 secondary metabolites from various *Ganoderma* species. The major secondary compounds isolated are (a) C30 lanostanes (ganoderic acids), (b) C30 lanostanes (aldehydes, alcohols, esters, glycosides, lactones, ketones), (c) C27 lanostanes (lucidinic acids), (d) C27 lanostanes (alcohols, lactones, esters), (e) C24, C25 lanostanes (f) C30 pentacyclic triterpenes, (g) meroterpenoids, (h) farnesyl hydroquinones (meroterpenoids), (i) C15 sesquiterpenoids, (j) steroids, (k) alkaloids, (l) prenyl hydroquinone (m) benzofurans, (n) benzopyran-4-one derivatives and (o) benzenoid derivatives. *Ganoderma lucidum* is the species extensively studied for its secondary metabolites and biological activities. *Ganoderma applanatum*, *Ganoderma colossum*, *Ganoderma sinense*, *Ganoderma cochlear*, *Ganoderma tsugae*, *Ganoderma amboinense*, *Ganoderma orbiforme*, *Ganoderma resinaceum*, *Ganoderma hainanense*, *Ganoderma concinna*, *Ganoderma pfeifferi*, *Ganoderma neo-japonicum*, *Ganoderma tropicum*, *Ganoderma australe*, *Ganoderma carnosum*, *Ganoderma fornicatum*, *Ganoderma lipsiense* (synonym *G. applanatum*), *Ganoderma mastoporum*, *Ganoderma theaecolum*, *Ganoderma boninense*, *Ganoderma capense* and *Ganoderma annulare* are the other *Ganoderma* species subjected to phytochemical studies [4]. So far, more than 20 species of *Ganoderma* (Lingzhi) fungi have been studied, including *G. lucidum*, *G. sinense*, *G. japonicum*, *G. capense*, *G. australe*, *G. tsugae*, *G. applanatum*, *G. tropicus*, *G. boninense*, *G. duropora*, *G. resinaceum*, *G. theaecolum*, *G. cochlear*, *G.*

atrum, *G. formosanum*, *G. boninense*, *G. colossum*, *G. concinna*, *G. amboinense*, *G. pfeifferi*, and *G. orbiforme*. Over 600 compounds were isolated and identified from the genus *Ganoderma*. The components in *Ganoderma* contained triterpenes, meroterpenoids, steroids, alkaloids, nucleosides, nucleobases, and polysaccharides, in which triterpenes were the main compounds, and more than 300 triterpenes obtained from it. With the use of new technology of separation and purification, the other types of compounds, such as meroterpenoids, alkaloids, nucleosides, and polysaccharides were reported in recent years [10].

Cultivation of ganoderma:

Commercial cultivation of *Ganoderma* has been introduced worldwide, especially in tropical Asian countries to meet the gradually increasing demand of the mushroom as a natural medicine. Wild *Ganoderma* is difficult to collect and to maintain its quality. In ancient times, *Ganoderma* was collected from the wild and consumed only by wealthy people, but a large proportion is cultivated today for the general population. Artificial cultivation of *Ganoderma* was attempted in 1937. However, the first successful cultivation for *Ganoderma* was performed in 1969 with the use of a spore separation cultivation method by a Chinese technician in the Institute of Microbiology, Chinese Academy of Sciences, Beijing. Since then, the cultivation of *Ganoderma* has been popular in China and other Asian countries, such as Japan and Korea. Traditional cultivation (since 1969) was based on inoculating one-meter-long natural logs without sterilization, which were then buried in a shallow trough. Most broad-leaf hardwoods can be used to cultivate *Ganoderma* species and logs are cut from living trees. Fruiting bodies took 6-24 months to emerge, but cropping could continue for five years. Since late 1980s, new methods have been developed that use short logs (15 cm or less). Today, this method is followed by most *Ganoderma* natural-log growers in China, Japan and Korea, as it takes several months to produce the fruiting body, mycelia-based and culture broth-based products have been considered as methods to ensure quality control and for continuous production throughout the year [1]. Wild *Ganoderma* usually grows on the trunks, stumps, fallen and rotten wood of broad-leaved trees in diffused sunlight woodland with high humidity requirements. In the natural environment, they can easily form a complete fruit body, but cannot form a cap in the laboratory. The Fungal Research Laboratory of the Institute of Microbiology, Chinese Academy of Sciences firstly discovered in 1991 that high air relative humidity (85–95%) was the key factor for the formation of basidiocarps and the release of the spores of *Ganoderma*. 37 The method and technology of largescale artificial cultivation of *Ganoderma* were realized in 1992, and it was also the first example of the successful use of modern scientific methods to cultivate *Ganoderma*. The research institute popularized this method free of charge, which has made an important contribution to the rapid development of *Ganoderma* industry in China. Rani et al. found that the sawdust supplemented with dextrose medium improved the quality and biological efficiency of *G. lucidum* because dextrose provided a good carbon source for the

Mycelial growth.³⁸ Using wheat straw as substrate to form *G. lucidum* fruiting bodies shorter time, higher yield, higher biological efficiency and lower cost.³⁹ [2].

Solid state cultivation:

A Slovenian patent [40] claimed a process of growing *G. lucidum* on a solid cultivation substrate using the solid-state cultivation in a horizontal stirred bioreactor. Beech sawdust was used as a solid cultivation substrate. The process enabled a precise leading and monitoring of the fungal growth at sterile conditions. Large quantities of biomass could be prepared according to the process to yield products applicable to pharmacy. The biomass could also be used as a solid inoculum for the further cultivation of *G. lucidum*. A World patent application with a Chinese priority [41] described a method for propagating fungi and producing fungal metabolites with medicinal activities, using a solid-state fermentation process and cultivation in bottles. The invention also described substrates for small- and large-scale fungal cultivation of *G. lucidum*, *Cordyceps sinensis*, *Antrodia camphorata*, *Trametes versicolor* and *Agaricus blazei*. Chen [28] reported that in North America, *Ganoderma* mycelial preparations for human consumption are produced by solid state fermentation on grain or soy-based products [5].

Artificial cultivation:

The methods of Lingzhi cultivation can be divided into two major types, including liquid-state cultivation (LSC) and solid-state cultivation (SSC). The SSC also can be divided into two methods based on the used raw materials, which are called as the log (or basswood) cultivation and substituted cultivation. At the beginning of the artificial cultivation of this valuable medicinal mushroom, only four species was used for trials, which included *G. lucidum* (Leyss. Ex. Fr.) Karst, *G. lucidum* (Leyss. Ex. Fr) Karst Vat., *G. japonicum* (Fr.) Lloyd, and *G. capense* (Lloyd) Through more than 40 years of development, the cultivation techniques have achieved significant progress. Currently, the various methods are widely used for commercial production. Artificial cultivation of Lingzhi fruit bodies It is necessary to meet the requirement of Lingzhi fruit body growth, which includes the nutrients components and the environmental conditions. Meanwhile, we must also master the culture methods [9].

Wood log cultivation:

There are two modes for the wood-log cultivation of *Ganoderma* in China, natural wood-log cultivation and sterile wood-log cultivation. Due to the advantages of its short growth cycle, high biological efficiency and high economic benefits, sterile wood-log cultivation has a wider application. The procedures for the sterile wood-log cultivation are as follows: selecting species of tree → timely felling → cutting timber and binding → bagging → sterilization → inoculation → management of

hypha growth → arrangement and burying soil → management of fruiting → fruit body harvest and drying → graded packaging [10].

IV. Conclusion:

From the review of literature, it is concluded that Ganoderma shows higher potentiality towards food industry and pharmaceutical industry. Since the earliest times, mushrooms have been treated as a special food. They have been widely consumed not only for their taste, texture, and nutritious composition, but also for their claimed therapeutic value. The practice of using fungi as medicine is found in the traditions of many cultures, past and present. In addition to usefulness as medicine, Ganoderma is formulated in numerous health foods for improving human health and promote longevity. The total no. of publications on Ganoderma in the world has exceeds 10000 with 7000 related parents. Over 1000 Ganoderma health food products are certified by Chinese government. Chinese medicine has long been used clinically; in the most cases the chemical basis for their therapeutic action has not been understood. It is used in the treatment of antidiabetic action, antitumor, nervous system regulations, liver protection and detoxicant action, respiratory system action, dystrophy studies, radiation protection. From Ganoderma many of the chemical compounds can be extracted such as terpenoids, polysaccharides, triterpenoids, meroterpenoides, sesquiterpenoides, steroids, polysaccharides and triterpenoids have been most thoroughly investigated from *G. lucidum* and related species.

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A Study on Size of Erythrocytes and Viscosity of Blood of Normal Person

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I. Abstract:

The subtle [acute] change in the physiology of erythrocytes at the cellular levels is documented in the present laser diffraction study. Using this technique one can differentiate the morphologies of erythrocytes. The size and shape of erythrocytes are determined usually by a microscope. This method besides being tedious cannot be extended to a large number of cells and samples given this simple and quick method has been developed for determining the size and shape of blood cells by employing the laser diffraction technique of blood we collect from normal healthy persons and is found to be 6.8-7.7 micrometres. The laser diffraction method is very rapid and simple for assessing the average size of the cells this could also be used with the advantage of having a diagnostic tool for assessing the variation in the size of human RBC. The viscosity of normal healthy blood is reported. By using the simple capillary tube is found to be 0.052-0.084 Poise and also investigated the surface tension 40-60 N/m and the flow rate of the blood was 4-7 m³/s. For this purpose, we need a blood sample of 2ml. This technique was indigenously developed in the laboratory.

Key Words:- Laser diffraction technique, Erythrocytes, Diffraction Rings, Capillary tube, Velocity, Volume flow rate, Viscosity, Blood from the patients suffering from diabetic and normal healthy persons.

II. Experimental arrangements:

A for shape and size of the particles:

To determine the shape and size of the blood particles the experimental arrangements were done as follows. The equipment used in the desired experiment is a Helium-Neon laser source. Which is arranged on a specially designed plywood table such that the light from the source should be passed through the narrow hole which was created on one side of the table? Another part of the experimental arrangement is the movable slide frame which is designed to fix the slides of the blood sample with it this frame was also fixed inside the specially designed table in such a way that the light source

coming from the neon laser should accurately incident on the slide. The third part of the arrangement is the screen which is fixed just behind the movable slide frame. On the screen, we obtained a diffraction pattern in circular form. Like this, the experimental arrangement was done.

To determine the viscosity and surface tension of the blood:

A Study on Size of Erythrocytes and Viscosity of Blood of Normal Person

1. To study the viscosity and surface tension of whole blood in the present investigation an open capillary viscometer was developed based on the theory proposed.
- 2 The viscometer is simple glass capillary tube of about 40 cm length.
3. Before starting the experiment the capillary tube was marked with two preset points B and the distance between them is about 10 cm in length.
4. The sample of blood was sucked into the capillary tube from one end of the capillary tube and measured the length of the sample.
5. The velocity was calculated from distance/time. From different lengths of the sample the time taken was noted and velocity was calculated.
6. We have developed an instrument to measure the velocity of the blood with different capillary tubes of different radii. We found in our experiment that as the radius increases the viscosity also increases.
7. The experiment was repeated for different diameter of the capillary tube for the different lengths.
8. Graphs were plotted taking $1/L$ on x-axis and velocity on y-axis according to the theory proposed.
9. Here the radius of different capillary tubes was measured by traveling microscope which has the least count 0.001 cm.

Technique used:

The technique of laser diffraction is based on the Babinet principle [The principle that the diffraction patterns produced by complementary screens are identical; two screens are said to be complementary when the opaque parts of one correspond to the transparent parts of the other] that gives Fraunhofer diffraction pattern [Diffraction of a beam of parallel light observed at an effectively infinite distance from the diffracting object, usually with the aid of lenses which collimate the light before diffraction and focus it at the point of observation] on the retina of the observer. The computational method of finding the average size of the diffracting particles is based on the measurement of the angle of diffraction, which involves the adjustment of the distance of the sample from the central hole such that the diffraction ring on the retina of the observer had its appropriate diameter. This method is always used to find out the size of the spherical particles. Since this method is tedious and with a parallax error, a new sophisticated method using a laser diffraction technique has been developed for

the determination of the size of erythrocytes. This arrangement consists of a specimen slide, laser and screen for the determination of the size of human erythrocytes. The sample was prepared by smearing a drop of fresh blood uniformly (thin film) on a microscopic slide and then introduced in between the laser and the screen with the smeared surface facing the screen. A He-Ne laser of power 2 Mw was employed for the diffraction purpose. This laser when passes through the blood sample gives a well-defined diffraction pattern on the screen. The radius r of the first-order diffraction minima was measured for different samples for a known "sample to screen distance" D .

The angle of diffraction is given by

$$\tan\theta = r/D$$

Where r = radius of the first circle;

D distance between slide and the screen. The mean diameter (d) of the blood cells was calculated using the equation taking into account the wavelength of the laser light.

From the Rayleigh's criterion the size or diameter (d) of the cell can be written as

$$d = 1.222 \cdot D / \tan \theta$$

$$1.222 \cdot D / r, \text{ where } \lambda = 6428 \text{ \AA}$$

4.4.1 Experimental arrangement

Viscosity of blood for normal persons is in the range 0.046 to 0.084 poise with a mean value of 0.0658 poise. Surface tension of blood for normal persons is in the range 47.91 to 59.32 dyne/cm with a mean value of 53.15 dyne/cm

III. Conclusions and scope for future work:

This chapter reports the conclusion drawn from the results of clinical and biophysical parameters of blood collected from the different donors for investigation. We performed the identification of the blood group of all samples of blood donors using anticoagulants and also collected their particulars about food habits, age and height information which are enclosing at the last in Appendix I of this project. Using diffraction principle. We manufactured an experimental setup to observe diffraction patterns using a laser source on different blood samples, we measured and reported the size & shape of erythrocytes using this technique, it is found to be in the range of 6.8 μm to 7.7 μm . We also reported some liquid parameters of blood samples i.e. viscosity and surface tension. We also presented the blood donors' particulars of their food habits, age etc. All these clinical data are helpful for the digitization purpose to give the proper treatment.

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BLACK HOLE

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I. Introduction:

When we look up into the sky at night, we get delighted. There is a peaceful atmosphere and we enjoy it a lot. It is a beautiful world of twinkling stars, spread in finitely all over the sky; some are bright while some others are dull. The sky appears to be quiet and peaceful and it gives a cool and refreshing feeling to anyone. But is the sky as quiet and peaceful as it appears? Not. Sun, our nearest star and the owner of the entire solar system is constantly radiating heat energy on us. It is extremely hot with a surface temperature of about 6000k. The interior is even hotter as millions of hydrogen bombs are exploding inside every second, under the huge gravity of the sun. The entire solar system forms a negligibly small portion of our Milky Way galaxy. There are millions of such stars in this Milky Way galaxy; some are even many times larger than our sun. And many such galaxies are shining in the sky and a lot of things are happening in each of these. Hence the sky is neither quiet nor peaceful as it appears to be but it is highly turbulent.

II. Who is governing all this turbulent motion in the universe?

As of today, it appears that there are certain massive objects, millions of times larger than our sun, who are ruling the entire motion of stars. We call them black holes. Because of their massive nature and heavy gravity, it absorbs everything that comes nearer and they will not leave even a trace of light, just like a perfect black body. Hence the name given is a black hole. Black holes are the most powerful bodies in the universe. They can eat and digest several mega-stars in the universe. And hence are scaring us for decades. They are highly dangerous due to the extreme gravity they have and are having maximum mystery. We can say that they are more than dark. When we peep through the doughnut-shaped outer dusty layer we observe an extremely small and thin inner disc rotating at the speed of millions of kilometres per second. This is called the event horizon. All the rules of the universe get broken down here and the rules governing here are not followed anywhere else. It is observed that every galaxy has a black hole at its centre about which the entire galaxy is revolving. Hence we can say that the black hole is the owner of each galaxy and is mainly responsible for the production, maintenance and destruction of the galaxy.

III. Production of a black hole:

A black hole is born from a massive star. Any star is a huge cloud of hydrogen gas (protons). The gravity of the star drags the matter to its centre. At the centre, hydrogen gas is crushed developing a nuclear fusion explosion dispersing the matter away from the centre. The size of the star reaches stability when these two opposite activities become equal. When a giant star has more than 10 to 20 times larger mass than our sun gets its hydrogen content exhausted totally in the nuclear fusion process and there is no radiation outburst the star starts collapsing under gravity. Such a star gets crushed at its centre releasing as much energy within a fraction of time as the sun emits in a year. In this supernova explosion what remains behind is an extremely heavy density mass concentrated at an extremely small region (of atomic dimension) called the black hole.

IV. The role of a black hole:

Once a black hole is born it starts grabbing stellar mass in the nearby region and it grows larger, using its extremely high gravity. Any mass near its event horizon speeds up towards it and eventually falls inside with the speed of light. Inside processes are unimaginably mysterious. Time stops here. The entered mass is heated to an extremely high temperature and broken down into elementary particles (protons). The gravity of a black hole is strong enough to collect the distant distributed matter in space over light years in the form of a cloud converting it into a star, which in turn starts revolving about the black hole. A collection of such stars forms a galaxy. When the stars revolve closer to a black hole they get grabbed like a monster attacking its prey. Sometimes the interaction between the star and the black hole is so strong that the stellar matter is vomited by the black hole over thousands of light years into space in the broken form. Thus it is the black hole that develops stars and galaxies makes them revolve around and at the same time it is also responsible for their destruction. Black holes not only grab the nearby stellar matter but can swallow smaller other black holes during a collision. (Galaxy andromeda is advancing towards our milky way). Our life depends on earth's rotation around the sun and the sun in turn rotates in the Milky Way about a black hole that is the king of the galaxy. Thus indirectly a black hole is responsible for our life on earth and hence there is an immense need to study the behaviour of black holes in greater detail. We know that they are scary but at the same time they are also responsible for sustaining life on planets like earth.

DARK UNIVERSE

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What we know about our universe?

It consists of stars, planets, comets, black holes and so on, which are moving in this universe in their way following certain rules and regulations. Each one consists of atoms (and further subatomic particles like protons, neutrons and electrons) which can be defined as matter. i.e. Matter has a certain mass, occupies a certain space in this universe, and is perceivable to our senses. And the thing which promotes the matter to do work is called energy.

Thus we can say that our universe is made up of matter and energy. But is that all in this universe?

Some observed facts:

1. Our universe is expanding continuously at an accelerated speed higher than the speed of light indicated by the Doppler shift in frequency of light by various stars called "red shift". Some unknown energy maybe, called dark energy, is responsible for such an expansion.
2. Gravitational lensing effect on light from distant stars is observed. i.e. Light is bending towards a point while travelling through vacuum. Some unknown mass maybe, called dark mass, is responsible for such a lensing effect.
3. When we observe galaxies in this universe we find that the stars are found revolving about the centre of the galaxy and we expect that the stars near the centre, revolve faster while farther stars at a lower speed on the contrary we observe all the stars in the galaxy are found revolving approximately at the same speed.
4. Galactic halos: the gravity of a galaxy is strong enough to bend the light of distant galaxies developing a shivering halo. The position and the size of this halo help us to estimate the amount of matter present within the galaxy, but again there is a mystery. The estimated amount of matter turns out to be 4 to 5 times larger than actual amount of stars present within the galaxy

Discussion:

All these things point out the fact that there is something else in our universe other than matter and energy which is invisible to us. Our bodies are not made to sense this additional thing. Dark matter is the name we give to all mass in this universe that remains invisible. We cannot see it but we know it is there. This substance does not interact with light hence totally invisible. Dark matter and dark

energy is spread all over space in this universe and there is nothing as such a vacuum that is responsible for the motion of visible matter such as stars, planets etc. It is dark matter and dark energy imparts mass to the visible matter. It can even pass through visible matter without getting affected, just as a ghost passes through the walls of a Haunted House. There is no interaction between dark matter and visible matter except gravity. Dark matter is responsible for binding galaxies together exerting gravitational force. It distorts the appearance of space. When we observe distant galaxies, they often appear stretched and have odd shapes due to gravitational lensing. The visible matter visible energy present in this universe comprises hardly 4% of this universe. Whereas 26% of the universe consists of dark matter which is invisible and 70% with invisible or dark energy. Thus about 96% of our universe is dark or invisible, and it is this dark matter and dark energy that are ruling our universe.

We don't know what the dark matter is made up of?

We already know about baryons like protons, neutrons, electrons and many other particles and there may be plenty of others still to be discovered. Dark matter might be consisting of some undiscovered particle, interacting with the ordinary matter with gravity alone. Let us call them wimps (weakly interacting massive particles). If at all the dark matter particles exist, then occasionally they may collide with each other in an interaction resulting in the emission of radiation. If any hard evidence for the dark matter is ever found; it will be in the form of a very small weak effect. Hence to detect these small signals we need to develop deep underground laboratories for eliminating on-ground noise.

Conclusion:

Dark matter may be complex but mysterious and with the advancement of technology, we are edging closer towards the truth. Dark matter might not even exist and observed facts in the universe are due to something else.

Green Jet Fuel

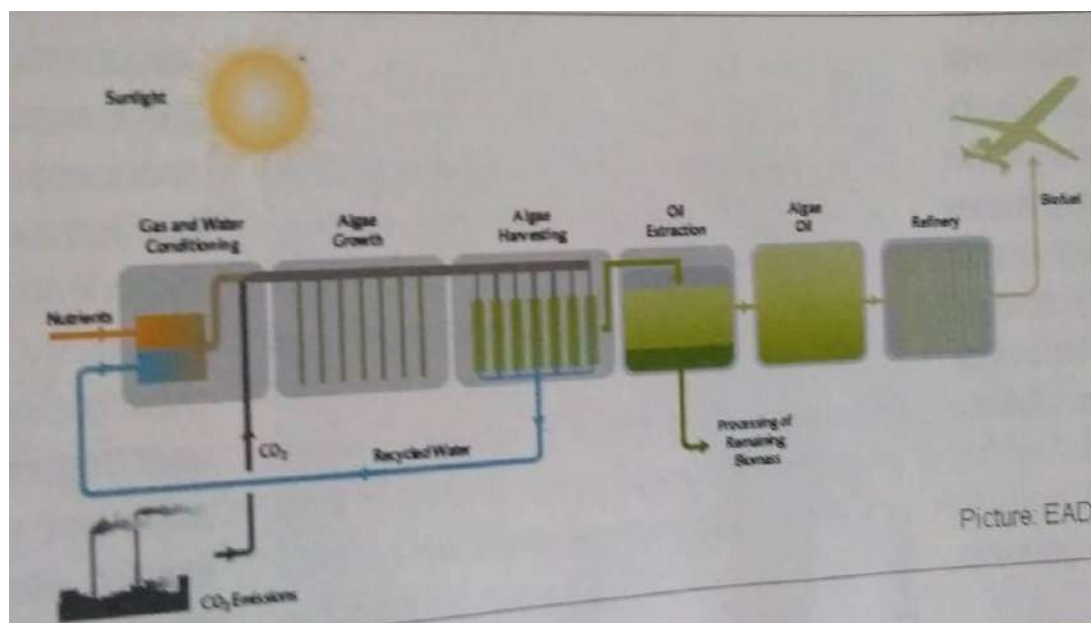
Algae could power flights in the future

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The idea of extracting fuel from algae has been theoretically considered since the 1950s, although the so-called third-generation biofuels seriously came into consideration only in the last decade after it was discovered that sugar, starch or vegetable oil - the traditional sources of biofuels - were more important as food sources. Research on second-generation biofuels, which derived biofuel out of non-food crops, is ongoing, but several players have gone straight to algae fuel research. Among them are major aviation industry players like Boeing, European Aeronautic Defense and Space Company and Honeywell - all part of the US-based algal Biomass organization. Algae are not the first feedstock to have been tried out for developing a “green” Jet fuel, *Jatropha curcas*, a tropical plant that has oil-producing seeds, has been used in several test flights by military and commercial airliners. Oil from The camelina plant has also gone through similar test flights. However, experts from the aforementioned aviation companies feel that algae fuel has the chance to make the biggest impact in the field of Aviation biofuels. The primary advantage of algae over its competitors is its ubiquity, as they can be grown anywhere; and in terms of per unit area, they grow faster than any other form of biomass. Algae grow best in saline conditions and do not have large fertile land requirements, unlike Terrestrial plants. It is also known to produce the same amount of oil compared to other plants in a much smaller area. Among the traditional biofuels, ethanol is not dense enough and cannot provide enough energy to power jet engines while biodiesel freezes at low temperatures common in high-altitude flights. The advantages of algae fuel over kerosene-based Jet fuel include lower nitrogen and sulphur content, a higher flash point and a lower freezing point. Moreover, it is also a “drop-in” replacement for Jet fuel, which means that little modification of the existing engine is required to burn Jet fuel



The basic processes of deriving Jet fuel out of algae are as follows. Algae are usually grown in ponds, containers, and fields with the supplier of adequate sunlight, water and nutrients such as calcium and Iron. They are then harvested through filters and most commonly centrifuge. Centrifuges are machines that put an object in rotation around a fixed axis, which creates a centrifugal force(an outward force away from the centre of rotation) that removes the majority of the water content. This is followed by oil extraction, which is done through physical and chemical processes. First, oil is physically separated from the algae after drying the latter and using high pressure from an oil press. Osmotic shock (sudden release of osmotic pressure) and ultrasonic reactors (create Ultrasonic waves) are also used for this purpose. Chemical solvents such as hexane and Benzene are used to extract the remaining oil. The oil dissolves in the solution and the pulp is filtered out. Oil and hexane are separated through distillation. These two steps can recover 95% of the algae Oil content. Chemicals, however, have injurious vapours and are harmful on accidental contact with skin, so alternative methods such as enzymatic extraction (using enzymes to degrade algae with water acting as the solvent) and using supercritical CO₂ (CO₂ liquefied and heated to a point where it can effuse through solids and dissolve in liquids) as a solvent. Algae oil can be refined into Jet fuel using modifications of traditional procedures such as hydrogenation and hydrocracking, which use a catalyst to add hydrogen to fuels, reducing the fatty acid compounds and rearranging the hydrocarbon chains. About 21 litres of Jet fuel can be extracted from 100 kg of algae. Technical challenges include perfecting algae strain selection to maximize yields, drawing up the ideal cultivation strategy in terms of location selection, choosing the most efficient and productive harvesting and extraction Technology, and finally,

ensuring that the refining process is as close as it can get to the traditional way. At present, algae Jet fuel cost around \$7 per litre compare to two regular Jet fuel which is priced at 0.68 dollars per litre; although the US Department of Defense believes that algae Jet fuel can be produced at around 0.8 dollars per litre with the present decade. However, intensive research and development and more test flights with commercial airliners (so far, algae have only been used in mixtures with kerosene and other biofuels) will be required to achieve this goal.

SHAPE MEMORY ALLOYS

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I. Abstract:

With increased emphasis on both reliability and multi-functionality in the aerospace industry, active materials are fast becoming an enabling technology capturing the attention of an increasing number of engineering and scientists worldwide. Here we review the class of active materials known as shape memory alloys, especially as used in aerospace applications.

II. Introduction:

The famous Aristotle quote, 'The whole is greater than the sum of its parts, is particularly adopted here. Alloys are a mixture of several different metals and other elements, each lending its properties to the compound. More than that though, alloys can exhibit unique properties that are different to the metals they are made up of. The earliest alloys created by man were brass, a simple alloy of copper and zinc, from the late Neolithic period and bronze, an alloy of copper and tin known to be in use from as early as 3000 BC. Although gold and silver were known and used at this time, they were used more or less, in the form they were found, for decorative purposes, as bronze fulfilled all practical needs.

III. The structure of alloys:

If we look at metal through a powerful electron microscope, we can see the atoms inside arranged in a regular structure called a crystalline lattice. In an alloy, apart from the atoms of the main metal, there are also atoms of the alloying agents dotted throughout the structure. There are two types of alloys

1. **Substitution alloys:** If the atoms of the alloying agent replace atoms of the main metal, we get what's called a substitution alloy. An alloy like this will form only if the atoms of the base metal and those of the alloying agent are of roughly similar size. In most substitution alloys, the constituent elements are quite near one another in the periodic table.

For example: Brass

2. **Interstitial alloys:** Alloys can also form if the alloying agent or agents have atoms that are very much smaller than those of the main metal. In that case, the agent atoms slip in between the main metal atoms (in the gaps or "interstices"), giving what's called an interstitial alloy.

For example: Steel

People make and use alloys because metals don't have exactly the right properties for a particular job. Iron is a great building material but steel (an alloy made by adding small amounts of non-metallic carbon to iron) is stronger, harder, and rustproof. Aluminium is a very light metal but it's also very soft in its pure form. Add small amounts of the metals magnesium, manganese, and copper and you make a superb aluminium alloy called duralumin, which is strong enough to make aeroplanes. Alloys always show improvements over the main metal in one or more of their important physical properties (things like strength, durability, ability to conduct electricity, ability to withstand heat, and so on). Generally, alloys are stronger and harder than their main metals, less malleable (harder to work) and less ductile.

Shape memory alloys:

Some alloys can be deformed when cold but returns to their pre-deformed shape when heated and are called Shape-memory alloy. It may also be called memory metal, memory alloy, or smart alloy. Because of their ability to recover strain in the presence of stress, SMAs are included in the class of materials known as active materials, which also includes piezoelectric, magneto-restrictive materials and shape memory polymers, among others. The two most important shape memory alloys are Copper-aluminium-nickel & Nickel-titanium but these can also be created by alloying zinc, copper, gold and iron. SMAs can exist in two different phases, with three different crystals structure and three possible transformations. There is another type of SMA called Ferromagnetic shape-memory alloy (FSMA). That changes shape under strong magnetic fields. These materials are of particular interest as the magnetic response tends to be faster. SMAs exhibit pseudo elasticity or super elasticity. e the atomic bonds between atoms stretch to an extreme length without incurring plastic deformation and because of this behaviour SHM is used in many criteria. SMAs display a phenomenon sometimes called super elasticity, but are more accurately described as pseudo-elasticity. "Superelasticity" implies that the atomic bonds between atoms stretch to an extreme length without incurring plastic deformation. Pseudoelasticity still achieves large, recoverable strains with little to no permanent deformation, but it relies on more complex mechanisms. SMAs exhibit at least 3 kinds of pseudo-elasticity. The two less-studied kinds of pseudo-elasticity are pseudo-twin formation and rubber-like behaviour due to short-range order. The first reported steps towards the discovery of the shape-memory effect were taken in the 1930s. According to Otsuka and Wayman, Arne Ölander discovered the pseudo-elastic behaviour of the Au-Cd alloy in 1932. Greninger and Mooradian (1938) observed the formation and disappearance of a martensitic phase by decreasing and increasing the temperature of a Cu-Zn alloy. The nickel-titanium alloys were first developed in 1962–1963 by the United States Naval Ordnance Laboratory and commercialized under the trade name Nitinol (an acronym for Nickel Titanium Naval Ordnance Laboratories). Their remarkable

properties were discovered by accident. A sample that was bent out of shape many times was presented at a laboratory management meeting. Shape-memory alloys are typically made by casting, using vacuum arc melting or induction melting. These are specialized techniques used to keep impurities in the alloy to a minimum and ensure the metals are well mixed. The ingot is then hot rolled into longer sections and then drawn to turn it into wire. How the alloys are "trained" depends on the properties wanted. The "training" dictates the shape that the alloy will remember when it is heated. This occurs by heating the alloy so that the dislocations re-order into stable positions, but not so hot that the material re-crystallizes. They are heated to between 400 °C and 500 °C for 30 minutes, shaped while hot, and then are cooled rapidly by quenching in water or by cooling with air.

Why SMA?

The shape memory materials give maximum efficiency when used as a working body in drives, these materials have found a wide utility in the open space due to the main condition of the latter zero gravity. It is proved that SMA drives can work reliably in conditions of open space. They have a simple design, small weight and dimensions that allow easy remote control and thus are superior to other exciting types. The first launch of SMA is TiNi to an Earth orbit in 1982. In addition to developing actuation applications; research is being performed into optimizing the dynamic properties of aircraft structural panels using SMA elements. Such applications of ten take advantage of the simple fact that an SMA will exhibit a change in elastic stiffness as it transforms. This behaviour is often secondary in other applications but can be very important in manipulating the dynamic response of a structure. SMA has many advantages over traditional actuators but does suffer from a series of limitations that may impede practical application. In numerous studies, it was emphasised that only a few patented shape memory alloy applications are commercially successful due to material limitations combined with a lack of material and design knowledge and associated tools, such as improper design approaches and techniques used. The challenges in designing SMA applications are to overcome their limitations, which include a relatively small usable strain, low actuation frequency, low controllability, low accuracy and low energy efficiency. There are many applications are intended to serve the needs of the biomedical industry while others are intended for use in consumer products. However, the aerospace industry is actively pursuing the development of new SMA technologies as well as the assimilation of SMAs into existing systems.

Applications of shm in aerospace:

From thermal engines engineers and other designers in many fields have been developing ways to convert thermal energy into mechanical energy via crystallographic phase change of SMAs, one

of the well-known early applications was the Hydraulic tubing coupling used on the F-14IN 1971. Since that designers have continued to utilize both the shape memory and pseudo-elastic effects of SMAs in solving problems in aerospace. Such implementations of SMA technology have spanned the area of fixed-wing aircraft, rotorcraft & spacecraft.

1. **In Fixed-wing aircraft:** Two of the most well-known fixed-wing projects of the past are the smart wing program and the smart aircraft and marine propulsion system demonstration. The smart wing programme was intended to develop and demonstrate the use of active materials, including SMAs. To optimize the performance of lifting bodies. SMAs wire tendons were used to actuate hingeless ailerons while an SMA torque tube was used to initiate span-wise wing twisting of a scaled-down F-18. In each of these applications, the SMA is used to provide actuation via shape recovery and recovery occurs at a non-zero stress.
2. **In rotor project:** SMA is used in rotor projects, and the project team working on the smart materials actuated rotor technology approached the same application differently. Instead of utilizing antagonistic wire to provide tracking tab actuation, an SMA torque tube should join to the tracking tab. Rotorcraft applications that do not include tracking tab manipulation include the use of SMA wires for the collective control.
3. **Spacecraft:** Space applications are those which seek to address the unique problems of release, actuation and vibration mitigation during either the launch of a spacecraft or its subsequent operation in a microgravity & zero-atmosphere environment. Although the actuated structure in space is subject to low gravitational forces which reduce required actuator power, heat transfer can quickly become problematic because of the lack of a convective medium. SMA components are suited for use in low-shock release mechanisms.
4. **SMAs have also been used as sensors.** In the case of sensing, SMAs are used to acquire information from a thermomechanical system. This is possible because of the material property changes which occur during the phase transformation induced during heating or loading. An early example of a space application concept utilized the ability of an SMA to act as a sensor in monitoring the deflection of large-span space structures.
5. The large hysteresis and strong non-linearity exhibited during the pseudo-elastic effect make SMAs suitable for use as **vibration dampers** and **isolators**.

Other important applications of SMA

6. **Stents** are most rapidly growing cardiovascular SMA cylindrical mesh tubes which are inserted into blood vessels to maintain the inner diameter of a blood vessel.

7. **The Simon Inferior Vena Cava (IVC) filter** was the first SMA cardiovascular device. It is used for blood vessel interruption for preventing pulmonary embolism via placement in the vena cava.
8. The unique properties of SMA such as constant force and superelasticity in heart surgery are a tissue spreader used to spread fatty tissue of the heart.

Although there are already a vast number of applications for SMAs, newer alloys are being discovered with different properties and there seem to be even more applications that these materials can be used in the future.

The future of sma:

Because of SMA's excellent properties now space designers are creating SMAs devices that would work under the force of the sun's heat. The use of SMA in micro-mechanisms could contribute a lot to the space system. Actuators made up of SMA can avoid shock loading, have a simple design and are easy to operate. A new investigation is being performed into the detailed dynamic response of SMA vibration isolation systems. Both numerical studies, including full thermo-mechanical coupling. And experimental studies are being performed to determine the operation regimes in which any adverse dynamical behaviour might exist to provide guidelines for avoiding such adverse behaviour in any future applications.

IV. Conclusion:

Overall the many uses and applications of shape memory alloys ensure a bright future for these metals. Research is currently carried out at many robotics departments and materials science departments. With the innovative ideas for applications of SMAs and the number of products on the market using SMAs continually growing, advances in the field of shape memory alloys for use in many different fields of study seem very promising. The enabling advantages of SMA utilization often outweigh the challenges, and because of this, the future of this field is becoming so interesting. Shape Memory Alloys are well-known and established in medical engineering. In recent years their importance in considering industrial applications also increased. Especially the high specific workload of the material and the simple working principle of SMA actuator systems possess them to be a suitable alternative to conventional drives. The benefits of the technology directly address the main demands on actuator technologies like miniaturisation, lightweight design and costs. Further SMAs can be an alternative to substitute rare earth metals.

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Solar solution to safe drinking water

Solar powered UV disinfection plant

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Water is an essential human need. But in today's milieu it is difficult to get air pollution free and clean source a for water supply. It has therefore necessitated treating water to make it potable. The problem of drinking water supply in the cities has been addressed successfully by disinfection by chlorination and by a centralized water supply system. However there is no centralized system of drinking water supply in rural India the objective of this work has been to design and develop a drinking water plant which can supply safe and reliable water to villages. The rural areas of India are generally devoid of industrial pollution except in some very specific pockets. However microbial contamination of drinking water remains the Chief source of water born diseases. Remote areas suffer the most as the erratic power supply denies access to safer ground water. With this background the present work of design and development of solar power drinking water UV disinfection was undertaken. As chlorine has been linked tour number of health problems due to formation of trihalomethanes which are possible human carcinogens and also require long contact time for disinfection, UV disinfection method has been preferred since villages have no pressurized water supply available, the disinfection unit chosen is a gravity flow type which Delivers 900 litres per minute this enables the unit to disinfect water available from Wells as well as borewells. The unit requires only 50 Watts of power which can be met by solar photovoltaic power. A 70 watt peak power solar module to suit all weather conditions has been used to charge the battery bank. The power to the disinfection unit is provided by the battery bank (12V, 120AH__ low maintenance lead acid type) and is controlled by the electronic control unit the entire system has been designed to run at 12 volt DC power. In the event of a number of consecutive no Sun days when domestic power also feels the system can be operated by the 12V battery bank of the system. This ensures uninterrupted drinking water supply to the villagers. The system was designed and developed and then installed at Haiderpur water works, Delhi Jal Board, New Delhi. It was evaluated for treatment of microbial contamination of Western Yamuna Canal water for different microbial count and turbidity and florets. At a flow rate of 15 liter per minute further study on microbial life was undertaken for another 10 to 15 days results were appreciable microbial count MPN 290/100ml also dropped to 0. An added study on the treatment unit with respect to the turbidity of water and the microbial treatment/disinfection was also undertaken. A preferred turbidity was created for 8 days in increasing and decreasing order to map the limits of turbidity for

microbiological treatment it with the ultraviolet system the experimental results reflected the limitation of the ultraviolet treatment unit to high turbidity. Therefore whenever turbidity in water is found to be high using the sand filter is desirable. The system is capable of supplying safe and reliable drinking water in the villages with the use of solar power on a sustainable basis system is modular in design and therefore it can be scaled up for larger in habitations.

Phytochemical study of three Medicinal Plants

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I. Abstract:

Aegle marmelos is commonly known as bael. It is a moderate-sized, slender, and aromatic tree. Extensive investigations have been carried out on different parts of *Aegle marmelos* and as a consequence, varied classes of compounds viz., alkaloids, terpenoids, fatty acids and amino acids have been isolated from its different parts. It has been already proved that various parts of plants such as a leaf, fruits, seeds, etc. *Aegle marmelos* have been used in ethno medicine to exploit its medicinal properties including astringent, antidiarrheal, anti-dysenteric, demulcent, antipyretic antioxidant and anti-inflammatory activities.

Acacia auriculiformis, commonly known as aura, ear leaf acacia, ear pod wattle, northern black wattle, Papuan wattle, and tan wattle, akashmoni in Bengali, is a fast-growing, crooked, gnarly tree in the family Fabaceae. Acacias are found in both extremely wet and very dry ecosystems and occur as either vigorous pioneers or as longer-term, more established components of the vegetation.

Leucas aspera commonly known as Thumbai is distributed throughout India from the Himalayas down to Ceylon. The plant is used traditionally as an antipyretic and insecticide. Medicinally, it has been proven to possess various pharmacological activities like antifungal. Antioxidant, antimicrobial, antinociceptive and cytotoxic activity. Further, studies reveal the presence of various phytochemical constituents mainly triterpenoids, oleanolic acid, ursolic acid and b-sitosterol, nicotine, sterols, glucoside, diterpenes, phenolic compounds (4-(24-hydroxy-1-oxo-5-n-propyltetracosanyl)-phenol). These studies reveal that *L. aspera* is a source of medicinally active compounds and has various pharmacological effects, hence, this drug encourages finding new therapeutic uses.

The present review aims to complete the medicinal values of *Aegle marmelos*, *Acacia auriculiformis*, and *Leucas aspera* and to generate through the research activity using modern scientific approaches and innovative scientific tools.

Keywords: *Aegle marmelos* plant, *Acacia auriculiformis* plant, *Leucas aspera* plant.

II. Phytochemical backgrounds:

The world is fertile with natural and medicinal plants. Medicinal plants are now more focused than ever because they have the capability of producing many benefits to society indeed mankind, especially in the line of medicine and pharmacology. The medicinal power of these plants lies in phytochemical constituents that cause definite pharmacological action on the human body. Some of the most significant bioactive phytochemicals are alkaloids, flavonoids, tannins, saponins, glycosides, phenolic compounds and many more. These natural compounds form the foundation of modern prescription drugs as we know them today (Chopra et al., 1986) [1]. Phytochemical is a natural compound that occurs in plants such as medicinal plants, vegetables and fruits, they work with nutrients and fibres to act against diseases or more specifically to protect against diseases. Phytochemicals are mainly divided into two groups, which are primary and secondary constituents according to their activity in plant metabolism. Primary constituents contain common sugars, amino acids, proteins and chlorophyll while secondary constituents comprise alkaloids, phenols, terpenes, compounds and many more.

Alkaloids-

One of the largest groups of chemical arsenals produced by plants is alkaloids. Many of these metabolic by-products are derived from amino acids and include an enormous number of bitter nitrogenous compounds. According to (Raffauf, 1996) [2] more than 10,000 different alkaloids have been discovered in species from over 300 plant families. Alkaloids often contain one or more rings of carbon atoms, usually with a nitrogen atom in the ring. The position of the nitrogen atom in the carbon ring varies with different alkaloids and with different plant families. In some alkaloids, such as mescaline, the nitrogen atom is not within a carbon ring. It is the precise position of the nitrogen atom that affects the properties of these alkaloids (Bentley, 1966) [3]. Although they undoubtedly existed long before humans, some alkaloids have remarkable structural similarities with neurotransmitters in the central nervous system of humans, including dopamine, serotonin and acetylcholine. The amazing effect of these alkaloids on humans has led to the development of powerful pain-killer medications, spiritual drugs, and serious addictions by people who are ignorant of the properties of these powerful chemicals (Cordell, 1981) [4].

Carbohydrates-

Carbohydrates are one of three basic macronutrients needed to sustain life (the other two are proteins and fats). They are found in a wide range of foods that bring a variety of other important nutrients to the diet, such as vitamins and minerals, phytochemicals, antioxidants, and dietary fibre. Carbohydrates encompass a broad range of sugars, starches, and fibre. The basic building block of a carbohydrate is a simple union

of carbon, hydrogen, and oxygen. The chemical definition of carbohydrate is any compound containing these three elements and having twice as many hydrogen atoms as oxygen and carbon.

Phenols:

Phenols are very widespread and are probably the largest group of secondary plant metabolites. These range from simple structures having a simple aromatic ring to highly complex polymeric structures and often exist in glycosidic forms (Wil iamson et al., 2005) [5]Phenols may be divided into several classes. Those of pharmaceutical importance are the simple phenolic compounds. Simple phenolic compounds consist of a single phenolic ring and often possess alcoholic, aldehydic and carboxylic acid groups. Examples include vanillin which is a phenolic aldehyde and salicylic acid which is a phenolic acid. It has been used internally for dyspepsia and flatulence.

Terpenoids-

Terpenes are a large and diverse class of organic compounds and are major biosynthetic building blocks within nearly every living creature. Chemically modified terpenes such as by oxidation or rearrangement of the carbon skeleton the resulting compounds are generally referred to as terpenoids. Terpenes and terpenoids are the primary constituents of the essential oils of many types of plants and flowers. Essential oils are used widely as natural flavour additives for food, as fragrances in perfumery, and as traditional and alternative medicines such as aromatherapy.

Flavonoids-

Flavonoids a subclass of polyphenols are a group of phytochemicals that are among the most potent and abundant antioxidants in our diet. The flavonoids are further divided into subclasses based on slightly different chemical structures. Although more than 4000 flavonoids have been identified, several appear to be important components of many fruits and vegetables.

III. Materials and methods:

Requirements: Chemicals such as:

Antioxidant- 1.1 diphenyl-2-picrylhydrazyl (DPPH), Ammonium molybdate Quidant Sodium phosphate (Na Po), Sulphuric acid (H:SO), ferric chloride (FeCl₃), ferrous chloride (FeCl₂), Hydrochloric acid (HCl), Sodium hydroxide (NaOH). Acetic anhydride (CHO Mayer's reagent, Benedicts solution, Alkali, Fehling's A & B solution, Methanol, Chloroform, All chemicals and solvents used in the study were of analytical grade

Collection of plant material:

Aegle marmelos, Acacia auriculiformis, & Leucas aspera plants were collected freshly from the field early in the morning. The samples were brought to the laboratory in a bag and dried at room temperature for 4-5 days, ground to form a powder. The powder was then weighed about 250g of each which is used for further work.

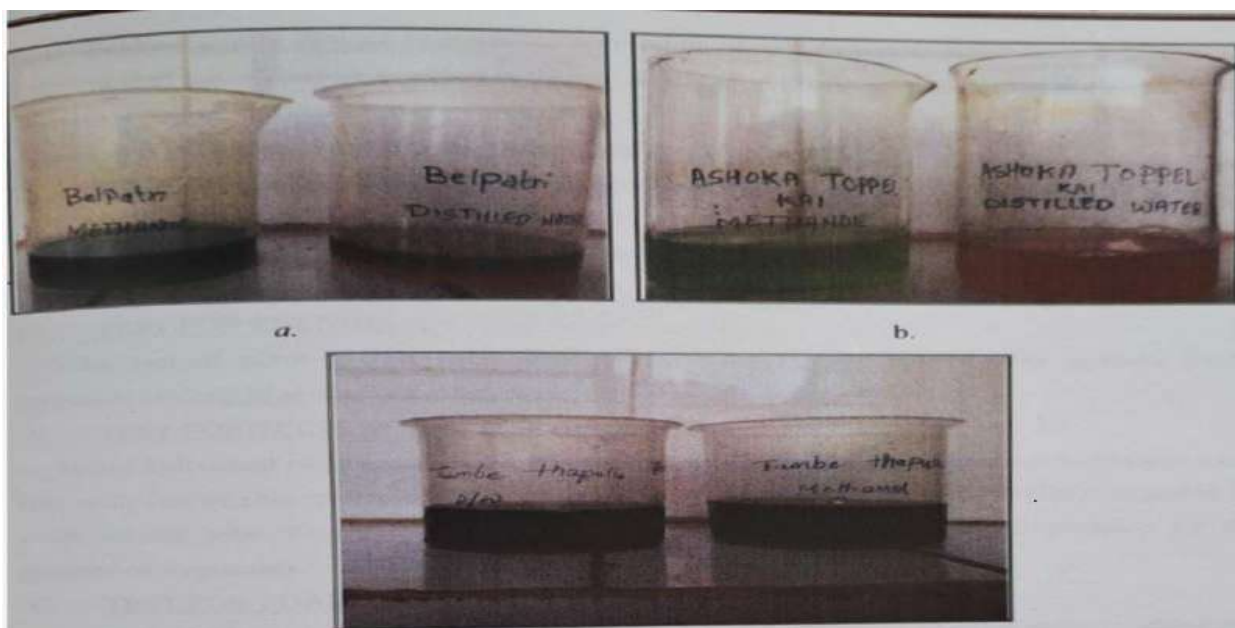


Fig 5(ab&c): Methanolic & aqueous extracts of three plants

Phytochemical analysis:**1. Test for alkaloids-**(Mayer's test)

Take 2ml of plant extract individually in a test tube and, add Mayers reagent. The formation of yellow precipitate was regarded as evidence for the presence of alkaloids in the extracts.

2. Test for carbohydrates-

a) Benedict's test- 2ml of Filtrates of individual plant extracts is taken in a test tube which are then treated with benedict's solution and heated gently. Formation of orange red precipitation.

b) Fehling's test- 2ml of Filtrates of individual plant extracts is taken in a test tube and treated with dilute Hcl, which is then neutralized with alkali and heated with Fehling A& B solution. Formation of red precipitate.

Two tests was s regarded evidence for the presence of carbohydrates.

3. Test for steroids- (Liebermann barchard test)

Take 1ml of plant extracts individually in a test tube and treated them with a few drops of chloroform, acetic anhydride and concentrated Sulphuric acid. The formation of dark red was regarded as evidence of the presence of steroids.

4. Test for phenol-

Take 1ml of plant extract individually in a test tube and treated with aqueous Fecl₂. Formation of deep blue was regarded evidence for the presence of phenol.

5. Test for terpenoids- (Salkowksis test)

2ml of individual plant extract of both mixture of methanol & distilled water is taken in a test tube with 1ml of chloroform and few drops of concentrated sulphuric acid (H₂SO₄) is added by a side of test tube. Formation of reddish brown precipitate was regarded evidence for the presence of terpenoids.

6. Test for foam-

0.5gm individual plant extract of both the mixture of methanol & distilled water is added in a test tube with 2ml of water and shaken till the foam persists. If there is the formation of foam then keep it constant for 10min, till the foam remains constantly.

7. Test for flavanoids-

2ml of individual plant extract is taken in a test tube with NaOH solution and treated with dilute HCl solution. Changing of yellow evidence for the presence of flavanoids.

IV. Results and discussion:

Phytochemical screening:

Qualitative phytochemical screening for the methanolic and aqueous extracts of *Aegle marmelos*, *Acacia auriculiformis*, & *Leucas aspera* made for the detection of Alkaloids, Carbohydrates Steroids, Phenols, Terpenoids, Foam, Flavonoids,

Table: Showing phytochemical constituents present in methanol & aqueous extracts of *Aegle marmelos*, *Acacia auriculiformis* & *Leucas aspera*.

PHYTOCHEMICAL TEST	SOLVENT INTERFERENCE					
	<i>Aegle marmelos</i>		<i>Acacia auriculiformis</i>		<i>Leucas aspera</i>	
EXTRACTS (Methanolic & Aqueous)	M	A	M	A	M	A
ALKALOIDS	-	-	-	-	-	-
CARBOHYDRATES (Benedicts test)	-	-	-	-	-	-
(Fehlings test)	-	-	-	-	-	-
STEROIDS	-	-	-	-	-	-
PHENOL	-	-	-	-	-	+
TERPENDIOS	+	+	+	+	-	-
FOAM TEST	-	+	-	+	-	-
FLAVANDIDS	-	-	-	-	-	+

The phytochemical test of three plants revealed the presence of phenol in aqueous extract of *Leucas aspera*, terpenoids in both methanolic & aqueous extracts of *Aegle marmelos* & *Acacia auriculiformis*.

The foam test was found positive in both aqueous extracts of *Aegle marmelos*, & *Acacia auriculiformis*. Flavanoids are found only in aqueous extract of *Leucas aspera* Table naI and figs 9 (a to 1).

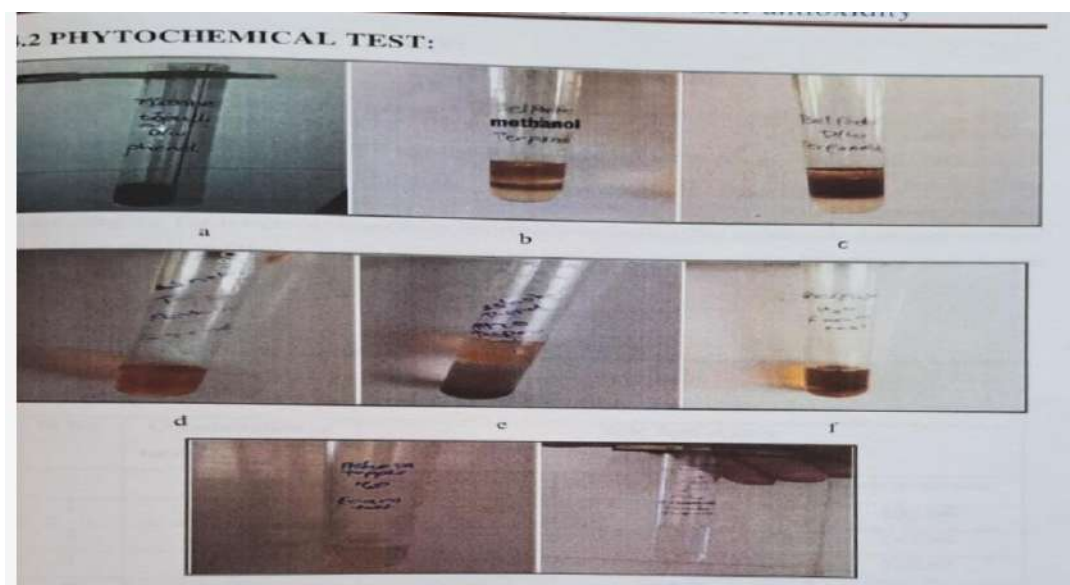


Fig 9 : a: Showing the presence of phenols in aqueous extract of *L. aspera* .
 b&e: Showing the presence of terpenoids in methanolic extract of *A. marmelos* & *A. auriculiformis*
 c: Showing the presence of terpenoids in aqueous extract of *A. marmelos*
 d: Showing the presence of steroids in methanolic extract of *A. auriculiformis*
 f&g: Showing the presence of terpenoids in aqueous extract of *A. marmelos* & *A. auriculiformis*
 h: Showing the presence of flavanoids in aqueous extract of *L. aspera*.

V. Conclusions:

- It is concluded that the two plants are the rich source of secondary metabolites and may have various other therapeutic applications.
- *Aegle marmelos* leaves contain a high amount of terpenoids,
- *Acacia auriculiformis* leaves contain a high amount of terpenoids,
- *Leucas aspera* leaves contain a high amount of steroids & flavanoids,

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SPECTRAL GRAPH

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I. Abstract:

Spectral graph theory has a long history. In the early days, matrix theory and linear algebra were used to analyze adjacency matrices of graphs and calculating the eigen value of the graph.

II. Introduction:

Graph theory is a branch of mathematics that deals with the study of graphs and their properties. It has its roots in the 18th century, when the Swiss mathematician Leonhard Euler published a paper titled "Solution problematic ad geometries sites pertinent is" ("Solution of a problem relating to the geometry of position") in 1736. Graph theory has a rich history, with its origins dating back to the 18th century, when Leonhard Euler solved the famous Königsberg Bridge Problem. Since then, many prominent mathematicians, such as Gustav Kirchhoff, William Tutte, and Paul Erdős, have contributed to the development of graph theory. In 1847, G.R. Kirchhoff (1824-1887) developed the theory of trees for their applications in electrical networks. Ten years later, a cayley (1821-1895) discovered trees while he was trying to enumerate the isomers of saturated hydro carbons C_nH_{2n+2} . About the time of Kirchhoff and Cayley, two other milestones in graph theory were laid. One was the "four color conjecture" which states that four colors are sufficient for coloring any atlas such that the countries with common boundaries have different colors. It is believed that A.F Mobius (1790-1868) first presented the four-color problem in one of his lectures in 1840 about 10 years later, A.De Morgan (1806-1871) discussed this problem with his fellow mathematicians in London. De Morgan's letter is the first authenticated

reference to the four colour problem. The problem became well known after Cayley published it in 1879. To this day the four color conjecture is by far the most famous unsolved problem in graph theory. The other milestone is due to sir W.R.Hamilton (1805-1865) in the year 1859 he invented a puzzle and sold it for 25 guineas to a game manufacturer in Dublin. The puzzle consisted of wooden, regular dodecahedron. The corners were marked with the names of 20 important cities : London, New York, Delhi, Paris and so on. The object in the puzzle was to find a route along the edges of the dodecahedron, passing through each of the 20 cities exactly once. Although the solution of this specific problem is easy to obtain, to date no one has found a necessary and sufficient condition for the existence, of such a route (called Hamiltonian circuit) in an arbitrary graph, this fertile period was followed by half a century of relative inactivity. Then a resurgence of interest in graphs started during the 1920s the past 30 years has been a period of intense activity in graph theory both pure and applied. A great deal of research has been done and is being done in this area. Thousands of papers have been published and more than dozen books written during the past decade. Graph theory has numerous applications in various fields, including computer science, social network analysis, transportation systems, biology, and linguistics, among others. In computer science, graphs are used to represent networks, such as the internet, social networks, and transportation systems. In social network analysis, graphs are used to study the connections between individuals and communities. In biology, graphs are used to represent biochemical reactions, gene regulatory networks, and protein-protein interaction networks. In linguistics, graphs are used to represent the structure of sentences and the relationships between words. In recent years, graph theory has become increasingly important in the field of machine learning, particularly in the area of graph neural networks (GNNs). GNNs are a type of neural network that can operate on graph data and have been applied to tasks such as node classification, link prediction, and graph generation.

III. History of Spectral Graph:

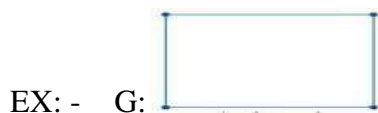
Spectral graph theory has a long history. In the early days, matrix theory and linear algebra were used to analyze adjacency matrices of graphs. When mathematicians such as Cayley and Sylvester studied the eigenvalues and eigenvectors of matrices associated with graphs. However, the field really began to develop in the 1950s and 1960s, with the pioneering work of mathematicians such as Fiedler, Hoffman, and Harary. In 1955, Fiedler introduced the concept of

the algebraic connectivity of a graph, which is the second smallest eigenvalue of the Laplacian matrix associated with the graph. He showed that this quantity is related to the connectivity and expansion properties of the graph, and provided bounds on it in terms of the size and degree of the graph. In the 1960s, Hoffman and Harary made further contributions to the field, introducing the concept of the spectrum of a graph and studying its properties. They showed, for example, that the largest eigenvalue of the adjacency matrix of a graph is always less than or equal to its degree, and that the smallest non-zero eigenvalue is related to the bipartiteness of the graph. In the 1970s, Chung and Graham introduced the concept of the normalized Laplacian, which is obtained by scaling the Laplacian matrix so that its eigenvalues lie between 0 and 2. They showed that this matrix has many interesting properties, including a connection to the conductance of a graph, which is a measure of its connectivity and expansion properties. In the 1980s, research in spectral graph theory expanded to include the study of random graphs, which are graphs generated by a random process. In particular, the work of Erdős and Rényi, and later Bollobás, focused on the spectral properties of random graphs, including their eigenvalue distribution and the behavior of the largest eigenvalue. Today, spectral graph theory remains an active and vibrant field of research, with connections to many other areas of mathematics and science. It is used to study a wide variety of problems, including network analysis, quantum computing, and machine learning, and continues to provide new insights into the structure and behavior of complex systems.

IV. Basic terminology and definitions:

Graph:

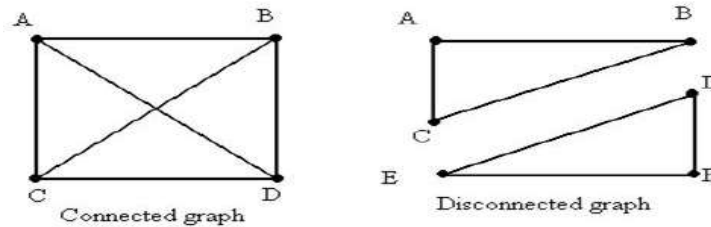
A graph G consists of a pair $(V(G), E(G))$, where $V(G)$ is the non-empty finite set whose elements are called vertices (point's) and $E(G)$ is a set of unordered pairs of distinct elements of $V(G)$ the elements of $E(G)$ are called edges (lines) of a graph G .



Connected and disconnected graphs:

A graph is said to be connected if every pair of its vertices are joined by a path and a graph which is not connected is said to be disconnected.

Ex:-



Cycle: A closed path is called cycle with $p \geq 3$ vertices.

Ex:-

Complete graph:

A complete (p, q) graph is a $p-1$ regular graph having $p(p-1)/2$ edges and is denoted by K_p .

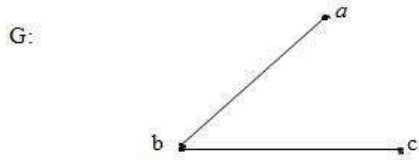
Ex:-

A complete graph is a graph in which every vertex has an edge to all other vertices is called a complete graph, In other words, each pair of graph vertices is connected by an edge. The complete graph with n vertices has calculated by formulas as edges. The complete graph with n graph vertices is denoted mn . Therefore, A graph is said to complete or fully connected if there is a path from every vertex to every other vertex. Complete Graph defined as An undirected graph with an edge between every pair of vertices.

Spectral graph:

Definition:

In mathematics 'spectral graph theory' is the study of properties of a graph in relationship to the characteristic polynomial Eigen value and eigen vectors of matrices associated to the graph such as its adjacency matrix.



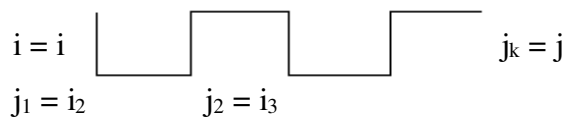
$$A(G): \begin{matrix} & \begin{matrix} a & b & c \end{matrix} \\ \begin{matrix} a \\ b \\ c \end{matrix} & \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix} \end{matrix}$$

$$\therefore \lambda_1 = 0, \quad \lambda_2 = \sqrt{2}, \quad \lambda_3 = -\sqrt{2}$$

In an analogous way we can use the spectra of various matrices (i.e. the eigen values of the matrices) to get information about a graph that would otherwise be difficult to obtain. In this series of talks we will give some introductory comments about connections between the eigen values of matrices and the properties of graphs. The study of the relations between these two objects is spectral graph theory. Thus a student of spectral graph theory not only needs to be familiar with graph theory but also must understand the basic tools of linear algebra.

Definitions and terminology:-

A graph $G=(V,E)$ consists of a finite non-empty set V . We also write $V(G)$, $E(G)$ for the vertex set and edge set of G . The number of elements in $V(G)$ denoted by n is called order of G . Usually we shall assume that $V(G)=\{1,2,\dots,n\}$. Let e_{ij} be the edge connecting vertices i and j . The set of distinct edges $\{e_{i_1 i_2}, e_{i_2 i_3}, \dots, e_{i_{k-1} i_k}\}$ is called path connecting vertices i and j . The length of the shortest path connecting i and j is called the distance between these two vertices.



The maximum distance between any two vertices in G is called diameter of G & is denoted by d . If there exist a path between any two vertices in G then G is connected, otherwise it is disconnected. Two vertices are called adjacent if they are connected by one edge. The corresponding relation between vertices is called the adjacency relation. The number of

neighbours of a vertex I denoted by d_i is called vertex degree. The maximum vertex degree is denoted by Δ . The adjacency matrix A is used to represent the adjacency relation, and so the graph G itself. The element A_{ij} of the adjacency matrix A is equal to 1 if vertices i and j are adjacent and otherwise 0.

Ex:-

$$\begin{pmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{pmatrix}$$

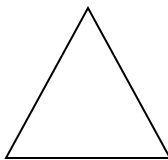
Eigenvalues of G are $\frac{1+\sqrt{5}}{2} \approx 1.6180$, $-\frac{1+\sqrt{5}}{2} \approx -0.6180$

$$\frac{1-\sqrt{5}}{2} \approx -0.6180, \quad -\frac{1-\sqrt{5}}{2} \approx 1.6180$$

Now we shall study about some graphs.

- ❖ A tree is a connected graph without cycles.
- ❖ A connected graph with m vertices and n edges is a unicycle graph.

$m = n = 3$:



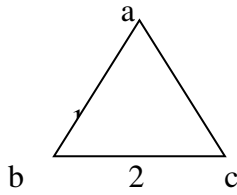
$m = n = 4$:



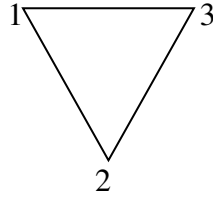
- ❖ It is called even (odd).
- ❖ The line graph $L(H)$ of any graph H is defined as follows:

The vertices of $L(H)$ are the edges of H and two vertices of $L(H)$ are adjacent whenever the corresponding edges of H have a vertex of H in common.

H:



L(H):



A spectral characteristic of paths is that they have all distinct eigen values.

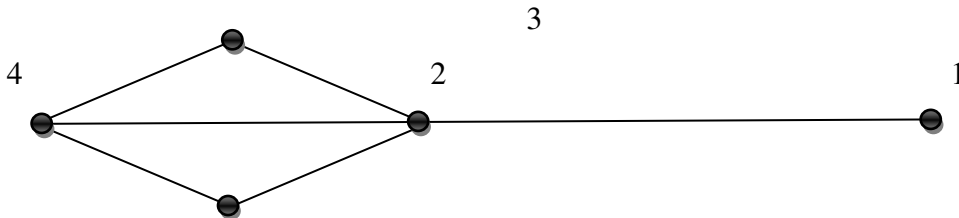
Types of matrices in spectra of graph:

We will introduce three of the most commonly used types of matrices in spectral graph theory. They are the adjacency matrix, the combinatorial laplacian and the normalized laplacian. We will see some simple examples of how the spectrum can be used for each of these types.

Adjacency matrix:

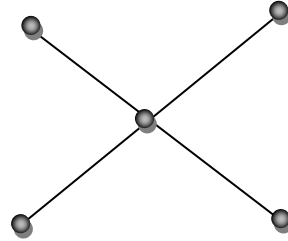
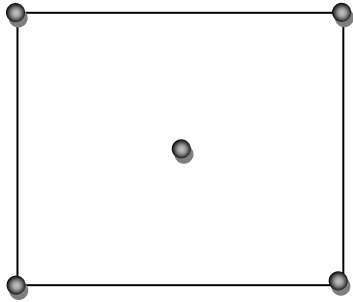
Given a graph G we can form a matrix A called the adjacency matrix by letting the vertices index on the columns and rows

$$A_{ij} = \begin{cases} 1 & \text{if it adjacent to } j \\ 0 & \text{otherwise} \end{cases}$$



For example:-

$$\begin{pmatrix} 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{pmatrix}$$



Two nonisomorphic graph whose adjacency matrices have eigenvalues - 2, 0, 0, 0, 2

For the graph in figure calculation shows that the eigenvalues for the graph are

2.68554....., 0.33490....., 0,-1.27133.....-1.74911

When dealing with the spectrum of a graph we are dealing with the set of eigenvalues

Most frequently it is more correct to say that we are dealing with a multi-set. So for example in the graphs given in figure we have 0 listed as an eigenvalue three times. Note that all the eigenvalues given in figure are real. This follows from the fact that the adjacency matrix is symmetric which in turn follows from the fact that the graph is undirected. This later fact comes in useful in some applications. These are the main reason that the majority of results in spectral graph theory deal with undirected graphs. In the adjacency matrix we have used 0s and 1s. In spectral graph theory almost all of the focus and energy has been put into only the few largest and few lowest eigen values, the middle range of the spectra being usually neglected.

Combinatorial laplacian:

The second type of matrix that we will consider is the combinatorial laplacian matrix, denoted as

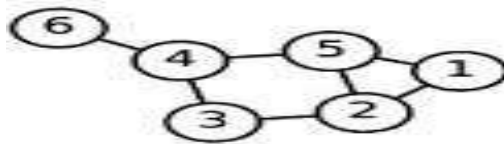
$$L_{ij} = \begin{cases} d_i & \text{if } i=j \\ 1 & \text{if } i \text{ is adjacent to } j \\ 0 & \text{otherwise.} \end{cases}$$

Where d_i is the degree of the i^{th} vertex. This is closely related to the adjacency matrix and is sometimes written as $L=D-A$ Where D is diagonal matrix, and A is adjacency matrix.

For the graph in figure the combinatorial laplacian will be

$$\begin{pmatrix} 1 & -1 & 0 & 0 & 0 \\ -1 & 4 & -1 & -1 & -1 \\ 0 & -1 & 2 & -1 & 0 \\ 0 & -1 & -1 & 3 & -1 \end{pmatrix}$$

With eigenvalues 5,4,2,1,0



D:

$$\begin{pmatrix} 2 & 0 & 0 & 0 & 0 & 0 \\ 0 & 3 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 3 & 0 & 0 \\ 0 & 0 & 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

A:

$$\begin{pmatrix} 0 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix}$$

L = D - A:

$$\begin{pmatrix} 2 & -1 & 0 & 0 & -1 & 0 \\ -1 & 3 & -1 & 0 & -1 & 0 \\ 0 & -1 & 2 & -1 & 0 & 0 \\ 0 & 0 & -1 & 3 & -1 & -1 \\ -1 & -1 & 0 & -1 & 3 & 0 \\ 0 & 0 & 0 & -1 & 0 & 1 \end{pmatrix}$$

Normalized laplacian:

The final type of matrix in spectral graph that we will consider is the normalized laplacian matrix denoted by L. As the name suggests this is closely related to the combinatorial laplacian that we have just looked at. For graphs with nonisolated vertices the relationship is given by $L=D^{-1/2}LD^{-1/2} = D^{-1/2}(D-A) D^{-1/2}$ For the graph in figure the normalized. Laplacian will be

$$L_{ij} = \begin{cases} 1 & \text{if } i=j \\ \frac{-1}{\sqrt{d_i d_j}} & \text{if } i \text{ is adjacent to } j \\ 0 & \text{otherwise.} \end{cases}$$

$$\begin{pmatrix} 1 & \frac{-1}{2} & 0 & 0 & 0 \\ \frac{-1}{2} & 1 & \frac{-1}{\sqrt{8}} & \frac{-1}{\sqrt{12}} & \frac{-1}{\sqrt{8}} \\ 0 & \frac{-1}{\sqrt{8}} & 1 & \frac{-1}{\sqrt{6}} & 0 \\ 0 & \frac{-1}{\sqrt{12}} & \frac{-1}{\sqrt{6}} & 1 & \frac{-1}{\sqrt{6}} \\ 0 & \frac{-1}{\sqrt{8}} & 0 & \frac{-1}{\sqrt{6}} & 1 \end{pmatrix}$$

With eigen values.

1.72871....., 1.5,1,0.77128.....,0A major difference between the two spectra though is that while for the combinatorial laplacian the eigen values can be essentially as large as desired.The normalized laplacian has eigen values always lying in the range between 0 and 2.One advantage of this is that it makes easier to compare the distribution of the eigen value for two different graphs, especially if there is large difference in the “size” of the graph.

V. Reference:

- 1) Introduction to graph theory
- By Gary Chartrand Ping Zhang
- 2) Spectral Graph theory with applications
- By Daniel. A. Spielmen

Mathematical Modelling of Infectious Diseases Using the Existing Model

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I. Abstract:

Infectious disease raise important ethical issue because their consequences are especially severs. They raise difficult Philosophical questions about how to strike a Balance between the protection of individual rights and the protection of public health.They raise issues of justice because they primarily affect improverished persons in developing countries.Although infectious disease was not traditionally a major topic of discussion in bioethics it has been a focus of attention in emerging literature on public health.

II. Introduction:

Infectious diseases are disorders that are caused by organisms, usually microscopic in size, such as bacteria, virus, fungi, or parasites that are passed, directly or indirectly, from one person to another. Humans can also become infected following exposure to an infected animal that harbours pathogenic organisms that is capable of infecting humans.Infectious diseases are a leading cause of death worldwide, particularly in low- income Bidar district especially in young children.In 2019, two infectious diseases- lower respiratory infections and diarrheal diseases – were ranked in the top ten causes of death worldwide by the World Health Organization (WHO). Both of these diseases can be caused by a variety of infectious agents.Deaths from the infectious diseases HIV/AIDS and Tuberculosis have fallen significantly in recent years, and they no longer appear on list of top ten causes of death globally. However, these diseases are still a leading cause of death in low-income district. Malaria is another infectious disease that is a top cause of death in low-income. These three diseases are due to single infectious agents.A newly emerged

infectious disease, COVID-19, caused by the virus SARS-CoV-2, become a top cause of death in 2020. According to data analysed by the Centers for Disease Control and Prevention(CDC), COVID-19 was listed as the third leading cause of death during 2020 in United States, behind heart disease and cancer.

III. Definition of Mathematical Modelling:

A mathematical model is a description of a system using mathematical concepts and language. The process of developing a mathematical model is termed mathematical modelling. Mathematical models are used in the nature sciences and Engineering disciplines, as well as in non-physical systems such as the social science.[M.M] , either a physical representation of Mathematical concepts or a mathematical representation of reality]Or definition. An abstract mathematical representation of a process device or concept. It uses a number of variables to represent inputs, outputs and internal states, and sets of equations and inequalities to describe their interaction.

Steps in Mathematical Model:

Step 1: Identify the problem.

Step 2: Make assumptions

- i. Identify and classify the variables.
- ii. Determine inter relationships among variables and Sub-models.

Step 3: Solve or interpret the model.

Step 4: Verify the model.

- i. Is it really addressing the problem?
- ii. Does it make sense?
- iii. Test it with real – world data.

Notations used and their meaning

Parameter	Description
T	Transfer rate from susceptible individuals to quarantine
β	Contact rate between susceptible individuals and exposed individuals
δ	Mortality rate due to coronavirus in symptomatic infected individual class
η	Rate of transfer of individuals from exposed class.
θ	Rate of quarantined individuals to asymptomatic infected individuals class
μ	Natural mortality rate.
ν	Rate of transfer of quarantined individuals to symptomatic infected individuals class
σ	Rate of transfer of exposed individuals to asymptomatic individuals class
Λ	Recruitment(natality) rate.
r_1	Recovery rate of asymptomatic infected individuals.
r_2	Recovery rate of symptomatic infected individuals.
γ	Rate of transfer of exposed individuals to quarantine

Positivity and boundedness of solutions:

In this section , we shall study the basic properties of the COVID-19 model. The model will be biologically meaningful if all the variables are non-negative for $t \geq 0$ in other words solution with non-negative initial conditions will remain non-negative for all time, which we shall study in the next lemma.

Theorem 1: Let us suppose

$F(t) = (S, E, A, I, Q, H, R)$ along with the initial conditions $F(0) \geq 0$ then the solution $F(t)$ of the COVID-19 model are non – negative for all $t \geq 0$.

Proof: Suppose

$t_1 = \sup\{t > 0, F(t) > 0\}$, which is positive quantity. Now multiplying the first equation of (1) by its integrating factor

$\exp\{\mu, t, + \int_0^t \lambda, (\tau), d, \tau\}$ and arranging the equation, we get

$$\begin{aligned} \frac{d}{dt} \left[S, (t), \exp \left\{ \mu, t + \int_0^t \lambda, (\tau), d, \tau \right\} \right] &= \pi \exp \left\{ \mu, t_1, + \int_0^t \lambda, (\tau), d, \tau \right\} \\ S(t_1) \exp \left\{ \mu, t_1, + \int_0^{t_1} \lambda, (\tau), d, \tau \right\} &= \\ = S(0) + \pi \int_0^{t_1} \exp \left\{ \mu, y, + \int_0^y \lambda, (\tau), d, \tau \right\} dy & \end{aligned}$$

Or,

$$\begin{aligned} S(t_1) &= \left\{ S, (0), +, \pi, \int_0^{t_1} \exp \left\{ \mu, y, +, \int_0^y \lambda, (\tau), d, \tau \right\} d, y \right\} \\ &\left\{ \exp, \left\{ - , \mu, t_1, + \int_0^t \lambda, (\tau), d, \tau \right\} \right\} > 0 \end{aligned}$$

$$\text{Or } S(t_1) = \left\{ S(0), + \pi \int_0^{t_1} \exp \left\{ \mu, y, +, \int_0^y \lambda, (\tau), d, y \right\} \left\{ \exp, \left\{ - , \mu, t_1 - \int_0^{t_1} \lambda, (\tau), d, \tau \right\} \right\} > 0 \right.$$

Similarly, it can be established that

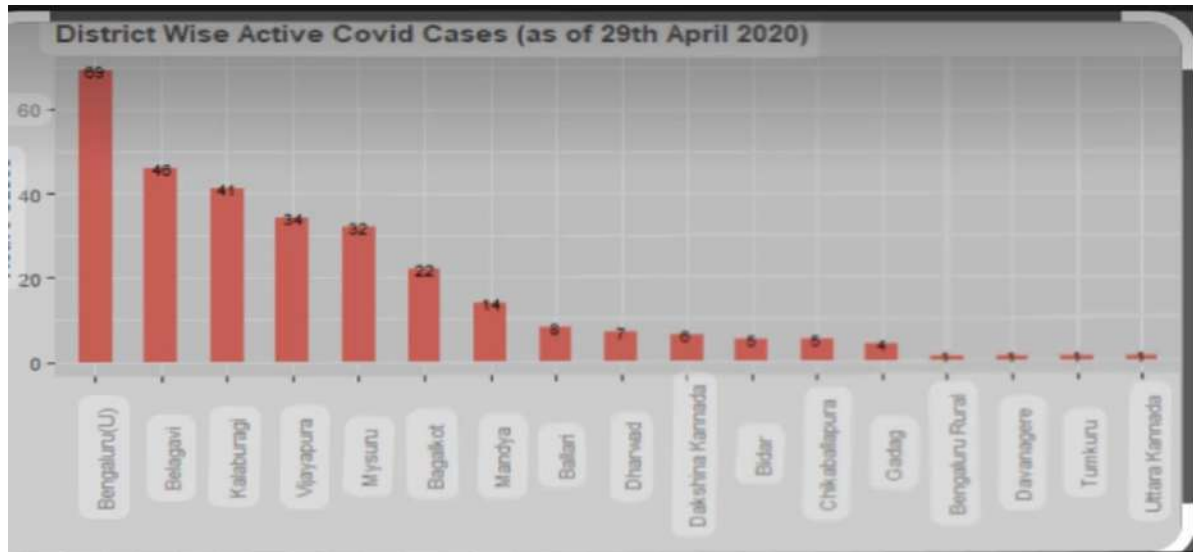
$$\begin{aligned} E(t_1) > 0, A(t_1) > 0, I(t_1) > 0, \\ Q(t_1) > 0, H(t_1) > 0, R(t_1) > 0. \end{aligned}$$

Thus, $F > 0$ for all $t > 0$.

The dynamic nature of the COVID-19 model shall be studied in the feasible closed region:

$$\Omega = \left\{ (S, E, A, I, Q, H, R), (S, +, E) \left(+, A, +, I, +, Q, +, H, +, R, \leq, \frac{\pi}{\mu} \right) \right\}.$$

It will be established that the closed region Ω is a positivity invariant and an attractor of all positive solutions of the COVID-19 model.



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REASONS AND REMIDIAL MEASURES TO COMBAT CORRUPTION IN INDIA

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I. Abstract: -

Kautilya has explained a lot of information about corruption in the political system of ancient India. After independence, the popular belief that Gandhi will not indulge in corruption got a setback, post-independence setup paved the way for heavy corruption. The menace which would have dealt with strong legal provisions has become a way of life in Indian society. Corruption is recognized as the single biggest problem facing the country today. It undermines democracy and rule of law, violates human rights, distorts the market and corrodes the moral fibre of people. The paper discusses the causes and possible remedial measures of corruption and the response of people in Indian society. It emphasizes the factors which provide fertile ground for the growth of corruption, degradation of moral values, absence of a strong anti-corruption law and its effective enforcement, accountability, consistency and a defective system of fighting elections. The paper also highlights the reforms necessary for fighting corruption in India.

Keywords: Kautilya, corruption independence, Gandhi, society, democracy, human rights, moral values, election.

II. Introduction:

Now a day's corruption can be seen everywhere in the world. It is like cancer in public life, which has not become so rampant and perpetuated overnight, corruption is not a new phenomenon in India; it has been prevalent in society since ancient times. History reveals that it was present even in the Mouryan period. Great scholar Kautilya mentions the pressure of forty types of corruption in his contemporary society. It was practiced even in Moghal and Sultanate periods. When the East India Company took control of the country, corruption reached a new height in India has become so common that people now are aware of the thinking of public life with it. In India corruption is rooted in all facts of society including government offices and large business entities, India has been ranked 72 among 180 countries

in the world corruption index as per a transparency international survey conducted for the year 2007 and therefore continues to be placed poorly in the corruption scale. Overview of Corruption in India Since 1991, economic liberalization in India has reduced red tape and bureaucracy, supported the transition towards a market economy and transformed the economy, with record growth rates of 9.2% in 2007 and 9.6% in 2006. However, though the Indian Overview of Corruption in India www.U4.no 2 economies has become the 6th largest in the world, its growth has been uneven across social and economic groups, with sections of society experiencing some of the highest levels of poverty in the world. Endemic corruption contributes to this uneven distribution of wealth. The cost of corruption, perceptible in public sector inefficiencies and inadequate infrastructure, is undermining efforts to reduce poverty and promote sustainable growth. The extent of Corruption Major Corruption Scandals Major scandals involving high-level public officials has shaken the Indian public service in recent years, with politicians and public servants regularly caught accepting bribes or mismanaging public resources. This suggests corruption has become a pervasive aspect of Indian politics and bureaucracy. A report by Global Integrity provides an overview of the major corruption scandals that have hit the headlines over the past years, including September 2000: Former President Rao was convicted of criminal conspiracy and corruption in the 1993 vote-buying scandal and became the first Indian Prime Minister to be convicted in a criminal case. He was acquitted on appeal, however, in March 2002. March 2001: Following the release by an Indian news website of a videotape showing 31 politicians, high-level officials, bureaucrats and army officials taking bribes, the Defense Minister and leaders of the ruling BJP party were forced to resign. Four defense ministry officials were also suspended. September 2005: Railway Minister Laloo Prasad Yadav was charged with misappropriating state funds in the long-running “fodder scam”. He and Bihar Chief Minister were charged with embezzling over US\$ 40 million in state funds intended for the purchase of animal fodder. In total, 170 persons were charged in connection with this scandal. In January 2006: A reporter in Assam writing articles accusing local forestry service officials of having links to timber smuggling was murdered. In March 2006: The BJP alleged corruption in a military contract to buy six submarines from two French companies, claiming that the government overpaid by approximately US\$ 113 million and used the excess to pay middlemen that helped secure the deal. In January 2009: Satyam Computer Services Ltd was barred by the World Bank from bidding for contracts for eight years and top officials were arrested after a major financial fraud over several years was disclosed. Corruption Surveys and Indices Though India is credited with having made considerable progress in terms of economic reform over the past few years, corruption is perceived to be widespread and entrenched at all levels of the political and administrative system. India ranks 85 from 180 countries surveyed in Transparency International’s 2008 Corruption Perception Index (CPI), with a score of 3.4. Since the first iterations of

the index, India has scored between 2.7 and 3.5, indicating that - despite some progress - corruption continues to be perceived as rampant and endemic by the various CPI sources.

Causes of corruption in India:

Corruption is a world problem and it is important. It has progressively increased and is now important in our society. Corruption in India has wings, not wheels. As the nation grows corrupt also grows to invent new methods of cheating the government and the public. The causes of corruption are many and complex. The following are some other causes of corruption.

1. The emergence of political life that believes in interest-oriented rather than nation or entered programs and policies.
2. Artificial sacker cities created by people with environmental intention weeks the fabrics of the economy.
3. Corruption is caused as well as increased because of the change in the value system and ethical qualities of men who administer the old idols of morality service and honesty or are regarded as anachronistic.
4. Tolerance of people towards corruption complete lack of intense public outcry against corruption and the absence of a strong public form to oppose corruption allows corruption to reign in our people.
5. The vast size of the population covered with white spread illiteracy and the poor economic infrastructure led to endemic corruption in public life.
6. In a highly inflationary economy, the low salary of government officials couples them to resolve to corruption graduates from the Indian Institute of Management with several experienced drives for handsome salaries than what government secretaries draw.
7. Complex laws and procedures data common people from seeking help from the government.
8. Red tape and bureaucratic procedures.
9. Increasing consumerism.
10. Lack of integrity and impartiality among National level politicians and bureaucracy.
11. The inability of the government to check the growth of black money.
12. Reluctance to adopt e-governance.

III. Remedial measures to combat corruption in India:

Corruption and poor countries:

Although corruption exists in all countries it is more widespread in low-income countries. This is not because people in poor countries are more corrupt than their counterparts in rich countries. It is simply because conditions in poor countries are more conducive to the growth of corruption. Bribery and graft are crimes of calculation and not of passion. Hence, when benefits are large, chances of getting caught are small, and penalties, when caught, are light, then many people will such comb. Low-income countries usually have highly regulated economies that give rise to large monopoly rents. Accountability in these countries is generally weak. Political competition and civil liberties are often restricted. Laws and principles of ethics in government are poorly developed and legal institutions charged with enforcing them.

Prevention of Corruption Act 1988:

The Prevention of Corruption Act 1988 was enacted to consolidate and update anti-corruption laws to effectively deal with the growing number of corruption cases involving public servants. Section 2 (c) of the Act defines a public servant as ‘any person, who holds an office under which he is authorized or required to perform any public duty. The Prevention of Corruption Act 1988 deals with offences such as criminal misconduct by a public servant, habitual acceptance of gratification or anything valuable besides legal remuneration, dishonest misappropriation of property under his control as a public servant for his use, abuse of position for any illegal or pecuniary advantage and accumulation of assets disproportionate to known sources of income. “A public servant convicted of any of the aforesaid offences may be sentenced to a minimum imprisonment of six months, which may extend to seven years and penalty”³. The current laws however have some gaps or loopholes that make them ineffective to tackle corruption. The most prominent Act on this front is the Prevention of Corruption Act, of 1988, which is a federal law enacted by Parliament to combat corruption in government agencies and public sector businesses. The Act prescribes penalties ranging from imprisonment for up to five years to an unlimited fine. However, fines imposed for criminal offences in India have seldom served as a deterrent on account of their quantum. Although the anti-bribery legislation in India has been on the statute books since 1988, successful prosecutions resulting in imprisonment are more of an exception than the Nile. There are various bottlenecks of the Act, one of which is the requirement of obtaining prior sanction of an appropriate authority before any court takes cognizance of an offence by a public servant. Experience has shown that these provisions have often resulted in long delays due to inordinate delays, according to sanction. No prior sanction should be required in cases where the officer is caught red-handed; and in

cases where permission is required, a timeframe should be specified within which the sanctioning authority must communicate its decision.

The Benami Act, 1988:

The Benami Transaction (prohibition Act) 1988 prohibits (someone else or fictitious name) transactions. Which was the introduction to provide for government acquisition of property held by Benami. This was put in place considering that most of the wealth in India which is accumulated through corrupt means gets invested in Benami's immovable property, gold and jewellers, and high value consumer goods. However, the rules to make the confiscation of property and other provisions effective have not been issued.

Central Vigilance Commission Act 2003:

The Central Vigilance Commission Act 2003 inquires into offences committed under the Prevention of Corruption Act 1983 by various categories of public servants of the central government, corporations established under the central acts, government companies, societies and local authorities controlled by the central government. "The Central Vigilance Commission, as the apex vigilance institution monitors vigilance activities of the central government and advises government authorities on planning, execution, reviewing and reforming vigilance work"⁴.

Indian Penal Code 1860:

While most provisions of the Indian Penal Code 1860 related to corruption by public servants have been repealed by the Prevention of Corruption Act 1988, section 166 and section 167 of the Indian Penal Code 1860 mandates imprisonment or fine, or both for a public servant, who deliberately disobeys law or frames an incorrect document with an intent to cause injury to any person. Further, a public servant, "banker, merchant or an agent may be held liable under section 409 for criminal breach of trust, if found guilty of misappropriation of the property entrusted upon him, which is a cognizable offence punishable up to life imprisonment in fine. A public servant may be prosecuted under the provisions of the Indian Penal Code 1860 or the Prevention of Corruption Act 1988, as appropriate in each case or under both the provisions"⁵. Although there are no separate laws prohibiting private corruption, certain provisions of the Indian Penal Code 1860 including section 420 (cheating), section 403 (dishonest misappropriation of property), section 383 (extortion) and section 503 (criminal intimidation) apply to private entities or individuals.

IV. Conclusion:

Corruption can be contained significantly by enacting stringent laws, improving law enforcement and awarding exemplary punishment to corrupt persons occupying high positions both in the private and public sectors. The above articulation demonstrates not just the strength of a system of checks and balances put in place by our Constitution, in that the Supreme Court has been a conscientious objector to executive excesses and legislative lacunae, but it also underscores the willingness of the Supreme Court to take on an 'activist' role and fill any governance deficit. Without often commenting on the efficacy of existing anti-corruption legislation the Supreme Court has, through its judgments and what may be perceived as judicial activism, brought about significant and far-reaching institutional; and regulatory changes and now, the requirement to India is economic growth and development to ensure, the corrupt free politics and administration, even it is required that the people or the citizens must be vigilant, to check the evil of corruption in politics and administration.

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Modi's Policies and Its Effect on Indian Economy

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I. Abstract:

The Article On Modi's Policies And Its Effect On the Indian Economy In 2019 Implies A Deep Impact Of The Current Policies Of the Central Government Towards the Development Of the Indian Economy At the International Level Which Is Considered As Fastest Developing Economy Of The World In Asia After China And Also This Articles Lies Important Achievements In The Indian Economy Under The Leadership Of Our Prime Minister Shri Narendra Modiji.

Keywords: Swachh Bharat Abhiyan, Digital Transfer Of Subsidies, PM Jana Dhan Yojana, Demonetization, Goods Services Tax.

II. Introduction:

This article guides a stepwise walkthrough of the Current Indian Economic Scenario with GDP = 6.7% in 2019 with a population of 1.36 billion and GDP PCI = 1,05,688 INR 2018-19 as per MSPI and Real GDP RS. 181.10 LAKH Cr (2019-20) AS AGAINST RS. 168.37 Cr (2018-2019) from the starting second term of important achievements in the Indian economy under the leadership of our Prime Minister Shri Narendra Modiji in 2019.

III. Identified and collected idea:

The articles emphasized the Indian economy from 2010 to 20219 and the current data of the below findings

GDP Rate of India for A Decade (2010-2020):

- 2010 = 10.4%
- 2011 = 7.2%
- 2012 = 6.5%
- 2013 = 3.2%

- 2014 = 6.9%
- 2015 = 7.3%
- 2016 = 7.6%
- 2018 = 6.8%
- 2019 = 6.7%
- 2020 = -6.60% (NEGATIVE IMPACT OF COVID-19)
- 2021 = 8.68
- 2022 = 4.8%
- 2023 = 5.5%

Top Five major Achievements of PM sri manmohan singh ji:

- GDP Clocked at 10.08% in 2006-07 As per MSPI (highest record since 1991 LPG Policy/ also during PM Rajiv Gandhi's Tenure 10.2%)
- Helped grow GDP in 2010= 10.2%
- In 2005 introduced Value added tax.
- On 23rd June 2005 Special Economic Zones(SEZ) Act 2005 for bringing FDI to India.
- NREGA ACT 2005 for giving 100 days job Security to Rural Family
- Indo-US Nuclear Deal B/w President George Bush and Pm DR Manmohan Singh India (IAEA – International Atomic Energy Agreement).

GDP of the top 10 countries AS per 2010 data Rank wise:

- U.S.A
- CHINA
- JAPAN
- GERMANY
- FRANCE
- U.K
- BRAZIL
- ITALY
- INDIA (9TH RANK)
- RUSSIAN FEDERATION

Top major Achievements of MODI Govt:

- Swachh Bharat Abhiyan Oct 2014: Over 92 Million Toilets Constructed Covering 500 Million Households/ As Per April 2018 46,36,128
- Individual Toilets & 3,06,064 Public Toilets.
- Rural Electrification
- Digital Transfer Of Subsidies To People Directly: In Dec 1985 Pm Rajiv Gandhi On the 100th Anniversary Foundation Of Congress Said “Only 15 Paise Reaches Poor Out Of 1 Rupee, Now It Has Risen To 75 Paise(Corruption).
- Pm Jana Dhan Yojana: More Than 15 Crores Banks Accounts Opened & 10 Crore Rupay Debit Cards Issued.
- Foreign Policy: China, Maldives, Srilanka, USA Developed.
- Goods Services Tax July 2017(Gst Proposed By Abv In 2000)
- Demonetization Of Indian Currency 08 Nov 2016
- Digital India “Make In India” Skill India
- Aadhaar Uidai Nov 2017 1.19 Bn Aadhaar Card Issued
- Smart Cities Project \$ 130 Bn Spending On Railways.
- Boosting Isro
- Rafale Fighters Jets Being Bought
- Nod For Real Estate
- Free Lpg Cylinders: Over 60 Millions Free Lpg Connections Given Of Which 50 % Nearly Sc/St Households
- Insolvency & Bankrupt Cy Code Dec. 2016 Legislation Enacted For Npas Recovering Debt And Led To Phone Banking
- Pmgsy
- Infrastructure: 2013-14 12km Highways Where As In 2017-18 It Has Risen To 27 Km Per Day Highways Constructed
- Pm Kisan Scheme Feb 2019 Budget Rs. 75,000/- Cr To All 14.5 Cr Farmers Will Get Rs. 6000/Year.
- National Health Protection Scheme Sept 23, 2018 Rs.5lakh/Family...For 10 Lakh Poor Peoples “Ayushman Bharat For Weaker Sections”
- Digital Locker Scheme 2015 For Important Docs.
- Pmkvy 2015-Nsqf-Nptel
- Pmjby

- Orop July 2018 Army ‘One Rank, One Pension’
- Pmksy- 2015 July 1
- Pmsby- Feb 2015
- Retail Pension Scheme Rs. 3000 For Self Employed Person, Shopkeeper. Also 18-40 Age Can Also Apply
- BetiBachao, BetiPadaoYojanaOct 2014
- Amrut 2015 Govt. Approved Rs. 50,000 Cr For 500 Cities And Towns Into Well Planned Living Spaces
- Mgnrega-2019- Jal Shakti Abhiyan In Rural India For Providing Safe Drinking Water To Rural People: Approved Rs. 15,000cr For July 2019 > 200,000 Projects Carried Out For Water Conservation In 1100 Districts Of Country.
- Start Up India Stand Up India 15 Aug 2015
- Pmay- June 1 2015 Housing For All By 2022.

GDP in the year 2019 as per their ranks

- U.S.A = 21.41 TN
- CHINA= 15.54 TN
- JAPAN = 5.36 TN
- GERMANY = 4.42 TN
- INDIA = 3.16 TN (5TH RANK IN THE WORLD)
- FRANCE = 3.06 TN
- U.K = 3.02 TN
- ITALY = 2.26 TN.

2020 A NEW INDIA

- Corporation Tax Rate Cut 30% To 22 % & 15% To Manufacturing Companies
- Rs. 25,000 Cr To Real Estate Fund
- Bank Recapitalisation : Rs 70,000 Cr Infusion Into Psb(Pnb=Rs.16,000 Cr &UbiRs. 11700 Cr
- Changes To Fdi Rules In Coal Mining And Manufacturing, 26% Fdi In Digital Media
- Merger Of Banks 27 To 12 Psb And 10 Psb Into 4 Entities
- Privatisation Of Cpse’s(Central Public Enterprises): Rs. 1.05 Tn Disinvestment, During Budget 2019-20, 90,000 Cr Targetted

- Disinvestment Process Of Govt. Securities As 53.2% Stake In Bpcl, 63.7% In Shipping Corporation Of India, 30.8% In Cci To A Strategic Buyer
- Removal Of Income Tax Surcharge On Foreign Portfolio Investment
- Supreme Court Agr Ruling: Adjustment Ross Revenue For India Telecom Finance: Vodafine India, Bharti Airtel To Raise Tariff

. Write down your studies and findings:

The Economy Of India Is The Sixth Largest Economy In The World Measured By Purchasing Power Parity (Ppp). The Country Is Classified As A Newly Industrialized Country, One Of The G-20 Major Economies, A Member Of Brics And A Developing Economy With An Average Growth Rate Of Approximately 7 Percent Over The Last Two Decades. India's Economy Became the World Fastest Growing Major Economy in the Last Quarter Of 2014, surpassing the People's Republic Of China. The Long-Term Growth Perspective Of The Indian Economy Is Positive Due Its Young Population, Corresponding Low Dependency Ratio, Healthy Saving And Investment Rates, And Increasing Integration Into The Global Economy. This Paper Deals with the Impact of Narendra Modi's Government on Various Socio-Economic Sectors of the Indian Economy. This Study Is Trying To Analyze the Progressively Changes In Various Economic Variables Through Implementing Various Welfare Programmes In Present Indian Economy And After The Modi Came Into Power.

IV. Conclusion:

When Narendra Modi Became India's Prime Minister In the Spring of 2014 The Indian Economy Was In The Doldrums. There Was A Clear Policy Paralysis In India's Central Government, In Large Part Due To The High Profile Corruption Cases That Involved The Central Government Bureaucracy And Politicians At The Time. Modi Promised Indians That "*Acche Din*" (Good Days) Were Coming. And There Was an Expectation That The Indian Economy Would Do Well Under A Pro-Business Political Regime, Headed By A Politician Known For Acting Strongly And Decisively. Modi Has Had Mixed Successes In Delivering On His Promises. Here's A Breakdown of Some of Modi's Key Policies and How He Has Performed.

1. **Demonetisation:** The aim of demonetization was to deal a death blow to the black economy by reducing the perceived use of illicit cash to fund terrorism and illegal activities. Instead, the policy led to a contraction of the Indian economy, and economic growth slowed down to a four-year low in 2018. Further, by 2018, around 99% of the bank notes that were made invalid had

been deposited with the banking system, suggesting that a large proportion of the 500 and 1000 rupee notes in circulation were not counterfeit notes or black money, as the government thought. Thus, demonetization led to a large economic loss without any clear benefits in terms of reducing the role of the black economy or corruption.

2. **Goods and services tax (GST):** The Modi government's second bold policy step was to launch the goods and services tax (GST) in July 2017. The GST policy aimed to create a common market in India, as opposed to the many different sales taxes that existed in different Indian states. The initial effect of the introduction of the GST was negative on the economy. This was especially the case for India's large informal sector – which employs the vast majority of people outside of agriculture.
3. **Delivery of public goods:** Modi delivered on a large number of important public goods schemes, which built on the initiatives of the previous government. For example, toilet coverage in rural India increased from 47% of all households in 2015 to 74% in 2017, in large part due to the Modi government's sanitation programme.
4. **Agriculture:** Around 50-60% of India's populations have some form of economic reliance on agriculture.
5. **Jobs** less created due to impact of covid-19.

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Principles of Work Ethic

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I. Abstract:

The major issue for the prosperity of a person, who is in the workplace, is being unfaithful towards duty in the fullness of work ethics. It is a, I must say, obstacle for personal and family development but only a vain struggle towards success. I implore you, especially those who are working in any sort of field, that one should carry a work ethic wherever they work. The following article gives you hints for a successful worker in many professional fields. Three important principles of work ethics are put forth for you to look upon.

1. Be faithful:

I don't think that even 25% of employees are faithful in their workplace, as per my observation is concerned wherever I went to get my work done in the public and private departments I strongly found that workers are treated with an unfaithful heart towards their work given. Obviously, it is a very serious issue that the country is facing. I remember one incident which amazes you how government employee treats the public if they carry any issues regarding their work to be done. It took place at Nemmadi Kendra, (I don't want to name it) once I had been to for my caste income certificate and there I found that no one was to help me and I had to wait for a minimum of 2-3 hours looking for the employee but at the end that employee never turned up to the office. What my pain is why government employees are not faithful towards their work assigned by the government is still unrevealing thing rather I say it is a mystery of mysteries. The same experience was experienced by one of my colleagues named Basvakiran who is going to Bhalki to get his work done regarding the 371 (J) Kalyana Karnataka certificate but his work is still pending and no employee is faithful towards their duty and responsibility. What to say about it? What to do for the such system implemented? Where should the common man go for getting his/ her work done? Many more questions lingered in my mind. I don't mean that there are no faithful workers at all I only mean why the majority of employees are doing unfaithful work. Corruption is another thing that boosts such an environment. But let me take you to one woman from whose faithful work my heart touched with and spirit rose high with work she has done. It was the scene appeared in the hospital where a young lady, I should say a sound young lady, working as a nurse treating patients tirelessly a sudden cry from a patient from an auto saying "Save my legs, save my life" which was heard by that young nurse made her rush to the patient then what happened was highly unforgettable. This happened a lady came

and took the patient to the emergency room for his treatment she called some other nurses to accompany and struggle for that patient like anything. Her 15 days of care and nursing made the patient heal and became a complete cure. There are very rare such workers devoted and understood their real responsibility in their workplace but indeed rarer like this young lady nurse.

2. Be Humble:

The problem with today's employees is not being humble in the workplace. I don't know why the employees are getting hyper in their workplace I guess that when an employee joins for work and once he/she joined, a kind of inhuman character develops. Pride is becoming their priority. As I have observed this atmosphere is everywhere irrespective of the private and public sectors of the workplace. The subordinate employee has no respect for their higher authority and the higher authority has no kindness towards their subordinates. There is no humility among the employees. Let me give my suggestions on how to be humble in the workplace, As many people think that being humble is being weak, being humble is being subordinate, and being humble is being blamed, but being humble is the strength in weakness, and it attracts the love from your colleagues. Let me take you to the story of Joseph whose humility in the workplace made him the kind of Egypt. Joseph was taken sold out as a slave by his brothers to Egyptians and taken to Egypt where he worked under Potiphar for many years being a humble slave boy. As he kept on working humbly in the family he gained love from his master. The master was pleased by the slave's work and promoted him to look after his entire property. For his master, the slave became a loved one because of his work and humbleness before his master. In his later days, he became the prime minister of Egypt nation second in command after the king. Isn't it interesting how a slave boy was taken from Israel and became the prime minister of the country Egypt? It happens when you are humble in your workplace. Many of us do not get promoted just because we carry no humility in the workplace. Joseph's life itself is the best lesson for us to grow in the workplace.

3. Be an Example:

An employee should be an example in his/her work. We have a lot of people who are ever inspired how to be an example in the workplace. If an employee is not an example in the workplace he/she can't be an example in his family life or social life. Because being an example in the workplace is a discipline in how we carry it and how we work. Her position does not take a role if the prime minister of a country is not an example in his work he is not even greater than attainer in a low-level institution but if a peon is an example in his work he is not, in y eyes, less than a prime minister of the country. For example, if I am a teacher in a college suppose I fail to do my duty responsibly then the question comes whether I'm an example or not. See, because I'm a teacher, my words should be an example, the way I look should be an

example, the way I behave should be an example, and the way I dress should be an example because the discipline we carry in work stands for an example.

II. Conclusion:

This is the article that focuses on the principles of work ethic in the work field. I have seen many people working but they are not prosperous, not developed, and not living in the peace of mind there is behind it and the reason is either they do not imply the principles of work ethic or simply they are not intended to work. Anyhow, work is important and working with a work ethic is more important to lift the family, society and the country.

Women Empowerment

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I. Introduction:

Empowerment means the process of becoming stronger and more confident especially in controlling one's life and claiming one's rights. The origins of the concept of empowerment go back to civil rights in the USA in 1960. Since the mid-1980s, the term empowerment has become popular in the field of development, especially among women. Women constitute almost 50% of the world's population but India has shown a disproportionate sex ratio whereby the female population has been comparatively low (48% female and 51% men or male) than males. As far as social status is concerned, they are treated as equal to men in all places. Even today gender disabilities and discrimination are found in India.

II. Historical background of women empowerment in India:

The status of women in India has been subject to many great changes over the past few millenniums. In the early Vedic period women enjoyed equal status with men later the status of women began to deteriorate approx. from 500 BC the situation worsened with the invasion of the Mughals and later on by European invaders. The real change came after independence. The Constitution of India guarantees equality to women (Article 14). There is another article that ensures the rights of women. For example- no discrimination by the state (Article 15 (1)). Feminist activism picked up momentum in India during the later 1970s later on many groups and NGOs have been working for the empowerment of women. We are proud that in India women got voting right much before the USA and some other European countries.

III. Empowerment of women in India:

Empowerment of women would mean equipping women to be economically independent, self-reliant, and have positive esteem to enable them to face any difficult situation and they should be able to participate in development activities. In India, the Ministry of women resource development (MHRD-1985) and the National Commission for Women (NCW) have been working. To safeguard the rights and legal entitlement of women. The constitution of India has provided some special powers to women for the reservation of seats (33%). Steps undertaken in India for women the constitution farmers were very much conscious of the problem of women's empowerment hence they ensured that the principle of gender

equality is enshrined in the Indian constitution in its preamble, fundamental duties and directive principles. The national policy for the Empowerment of Women (2001). The policy was aimed at ensuring women's empowerment through positive economic and social policies for the overall development of women. It also accesses women to health care, quality education, participation and decision-making in the social, political and economic life of the nation.

IV. Social empowerment of women:

Under the social empowerment of women, steps need to be taken to improve the health status of women; reduce maternal mortality, especially in the areas which do not have good medical facilities. A program for checking the spread of sexually transmitted diseases like HIV/Aids and injection/ communicable diseases like TB needs to be launched. Awareness programs need to be organized for creating awareness among women especially belonging to the weaker section about their rights.

V. Education and empowerment:

Education is a powerful tool for social transformation. Hence, education for women has to be paid specific attention to. Greater access for women to education must be ensured in the educational system. Gender sensitivity must be developed. A watch has to be kept drop-out rate of girls and corrective measures should be taken to check drop-out rates.

VI. Conclusion:

The empowerment of women has become one of the most important concerns of 21st century not only at the national level but also at the international level. Efforts by the government are on to ensure gender equality but government initiative alone would not be sufficient to achieve this goal. Society must take initiative to create a climate in which there is no gender discrimination and women have full opportunities of self-decision-making and participating in the social, political and economic life of the country with a sense of equality.

INTERNATIONAL FINANCIAL MARKET: A CRITICAL REVIEW

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I. Abstract:

International financial integration analyzing firms from various countries raising capital, trading equity, and/or cross-listing in major world stock markets. The relationship among the equity markets of the developed and emerging countries has been examined extensively in the literature. This paper studies the interdependence among the major stock markets of the world. Using the monthly data from 2011 to 2021, we examine the stock market indices of India (Sensex), Hong Kong (Hang Seng), the USA (DJIA) and the UK (FTSE-100). Co-integration technique has been employed to study the long-term linkages among the markets. We found that the equity markets of India and Hong Kong are co-integrated with the other markets whereas the markets of the USA and UK are not.

Key words: Market, Finance, International, Equity, Stock.

II. Introduction:

The analysis of financial integration in the international financial markets. Financial literature has presented a strong emphasis on the interaction among international financial markets. The interest has increased considerably following the abolition of foreign exchange controls in both mature and emerging markets during the last fifteen years. The cross-border movement of funds has increased with the world moving towards a free trade zone. Given the technological developments in communications and trading systems and the introduction of innovative financial products, investors today face opportunities to maximise their returns by diversification. Hence, the following has been investigated in the context of equity markets: Do the markets move together over time so that benefits from cross-border diversification get exhausted? How much of the movement in one market can be attributed to innovations in another? If stock markets move together, then investing in various markets would not generate any long-term gains from portfolio diversification. Therefore, both investors and academicians need to know whether stock markets are interlinked. The issue is also important for policymakers for the following reason: if stock markets are found to be closely linked then there is a danger that shocks in one market will spill over to

the other markets. Our analysis is based on four countries, namely, the United States of America (USA), the United Kingdom (UK), Hong Kong and India. The majority of the studies undertaken in this field have focused on integration either in the emerging world or in the developed world. The sample of countries was selected to represent both the blocs, with US and UK representing the developed markets, Hong Kong and India the emerging markets.

III. Review of literature:

There have been numerous studies on market integration and interdependence. While the results of these studies are often inconsistent, they usually hold implications for asset diversification and the efficient market hypothesis. A paper by Golka C. Nath (2003) analyses the effect of financial liberalization on the integration of the Indian stock market with other developed countries. For this purpose, he compares the National Stock Exchange with six markets including Tokyo and NASDAQ. He analyses the data for daily returns and uses the descriptive statistics of each market for inter-country comparisons. He takes the standard deviation from the mean of the daily returns data as the proxy for the degree of integration and concludes that the markets are integrated and moves in tandem. He also examines the graphical movements of the returns over the given period to conclude. Botha and Apostolellis make use of the co-integration techniques on the log process from six markets: South Africa, the US, Hong Kong, Singapore, Taiwan and South Korea. The tests are performed for verifying the stationarity of the data and then the co-integration techniques are applied to test for the stationarity. Augmented Dickey-Fuller test is used for the former and co-integration Engle-Granger and Johansen methodology has been used. The long-term co-integration tests indicate that the markets in the sample share a single stochastic trend. The results suggest that the markets in the sample tend towards a long-term equilibrium, thus limiting the benefits of diversification in these markets. To successfully trace the dynamic short-term relationships that exist in these markets, innovation accounting tests were used. In his paper, Robert Korajczyk (1995) investigates one measure of financial integration between equity markets. He uses multifactor equilibrium Arbitrage Pricing Theory to define risk and to measure deviations from the 'law of one price.' It measures the deviations of asset returns from the equilibrium model of returns constructed assuming market integration. He applies the integration measure to equities traded in 24 countries (four developed and 20 emergings). The measure of market segmentation tends to be much larger for emerging markets than for

developed markets, which is consistent with large barriers to capital flows into or out of emerging markets. The measure tends to decrease over time, which is consistent with growing levels of integration. Golaka C Nath and Sunil Verma (2003) examine the interdependence of the three major stock markets in South Asia. Using daily stock market data from January 1994 to November 2002, they examine the stock market indices of India (NSE-Nifty), Singapore (STI) and Taiwan (Taiex). On employing bivariate and multivariate co-integration analysis to model the linkages among the stock markets, no co-integration was found for the entire period. Hence, they conclude that there is no long-run equilibrium.

IV. Definition and meaning:

Financial integration and segmentation:

Financial integration also plays an important role in financial stability, as financial integration and financial stability can be mutually reinforcing. As evidenced by the years before the financial crisis, the stability of the financial system contributes to financial integration. At the same time, a more integrated financial sector typically improves the resilience of the financial system through more competition, better diversification and risk-sharing, as well as through more liquid markets. The advantages of stable and integrated financial markets are manifold. They allow us to reap the benefits of the single EU market for capital and financial services. A better allocation of capital translates into lower prices, more choices for individuals, and better business opportunities for firms which ultimately leads to higher economic growth. Hence, for the last quarter of a century, the creation of a single market for capital and financial services has been a central goal of the European Union. The pursuit of this goal has generated many policy initiatives over the years. Most recently, the launch of the euro was a landmark achievement in this regard, and the Financial Services Action Plan has removed major obstacles to financial integration that stemmed mainly from legal and regulatory segmentation. As a result of these policy initiatives, financial integration increased steadily in the years leading up to the crisis. However, the process was not homogeneous across all sectors. In some market segments such as the money and financial markets, financial integration increased significantly and rapidly. In others, however, the process was slower and, in fact, never completed. The case in point is retail banking. Despite differences in speed in different sectors, it was widely assumed that financial integration was a continuous process and that financial integration was a one-way street once all legal barriers were removed. However, the financial crisis has demonstrated that financial integration cannot be taken for granted: the process of financial integration was brought to a halt and even reversed in some market segments. Researchers have seen two main reasons for this development. First, some market developments before the crisis were not signs of

increasing integration. What I am referring to is the complete compression of cross-country yield differentials before 2007. While the compression had been interpreted as an indicator of financial integration, it was, in fact, a sign of a systematic under-pricing of credit risk. And second, the pre-crisis institutional set-up had shortcomings and proved unable to support the single market in times of crisis. Regulation, supervision and crisis management had been organised along national lines, with some elements of cross-border cooperation. This approach was incapable of adequately preventing the build-up of risks. Moreover, when the risks finally materialised, the fragmented crisis management arrangements led to policy responses that were rational from a national perspective, but suboptimal from a European point of view. The fragmented arrangements also induced banks to withdraw behind national borders. The resulting halt of financial integration, and even reversal in some segments, was the first setback in the European Union's quest to achieve a single market for capital and financial services. To preserve the benefits of a single market and to reverse these trends, decisive action has since been taken in different directions. Where economic governance is concerned, new crisis resolution instruments have been created: the European Financial Stability Facility has been established, and the European Stability Mechanism will enter into force shortly. A key milestone in this respect is also the adoption of the "six-pack". Let me take this opportunity to warmly thank the Commission for the work that has been done in these areas through difficult times in the last few years. Regarding the financial sector, financial supervision underwent a comprehensive reform: three European Supervisory Authorities were established, and the European Systemic Risk Board now adds an EU-wide macro-prudential perspective that was missing before the crisis. The concept of financial integration can be interpreted in many ways. One of these focuses on geographical integration. This form of financial integration includes the international integration of national financial markets which is the subject of this paper and the international integration of financial institutions/companies i.e. cross border cooperation and ownership relations between banks and between insurance companies. Thus, if equity markets are integrated, the price of risk is the same everywhere. When markets are integrated, assets of identical risk command the same expected return regardless of the domicile. If stock markets move together then investing in various markets would not generate any long-term gain for portfolio diversification. In the short run, however, markets are not perfect and asset diversification is possible due to the existence of arbitrage opportunities. Financial integration in the short run is indicated by inter-linkages among the markets considered.

Sources of data:

In this paper, the researcher used the stock market indices to study the integration of equity markets of India, the UK, Hong Kong and the US. We wished to take stock indices that were reflective of all the sectors of the economy i.e. broad-based indices and those that represent the most actively traded stocks

(blue chip companies). Accordingly, our choice set consists of the Bombay Stock Exchange (BSE) Sensex for India, Dow Jones Industrial Average (DJIA) for the US, FTSE-100 for UK and Hang-Seng for Hong Kong. Monthly data for last the 10 years (from 2001 to 2011) have been taken into consideration.

V. Methodology:

In this article's analysis of testing the presence or absence of integration in the world equity markets, we adopt three methods:

- Correlation between the different stock indices
- Co-integration technique
- Graphical analysis of price indices and their returns

Correlation between the different stock indices:

In the first step towards our analysis of integration among the financial markets, we use the correlation between the stock price indices of the countries considered. For this, we obtain the correlation matrix. The correlation values suggest the extent of linkage between the indices. It shows how changes in one index affect the other- the higher the correlation, the higher the co-movement between the indices.

Co-integration:

The first step in the co-integration technique is to check whether the series considered are stationary or not at the level and if it is non-stationary then to find out the order in which they are integrated. For this, we need to perform the Augmented Dickey-Fuller test (ADF). A series is said to be stationary if the mean and auto-covariance of the series do not depend on time. While performing the ADF test we proceed by considering the three equations:

$$\Delta Y_t = \gamma Y_{t-1} + \varepsilon_t$$

$$\Delta Y_t = a_0 + \gamma Y_{t-1} + \varepsilon_t$$

$$\Delta Y_t = a_0 + \gamma Y_{t-1} + a_2 t + \varepsilon$$

The first equation is a pure random walk model. The second equation consists of an intercept term indicating the presence of drift. The third equation consists of drift and a linear time trend. We test the null hypothesis $H_0: \gamma=0$ i.e. presence of unit roots for each of these equations. The test statistics against the critical values are checked and the null hypothesis is accepted or rejected if t-statistics is greater or less than the critical value respectively. Once we get the order of integration using the ADF test, we

proceed with the method of co-integration to test the presence of co-movement between the different stock market indices. Co-integration method is used to model the dynamic co-independence that is often found in the financial market. Co-integration has emerged as a powerful technique for investigating common trends in multivariate time series and provides a sound methodology for modelling both long-run and short-run dynamics in the system. The fundamental aim of co-integration analysis is to detect any common stochastic trends in the price data and to use these common trends for a dynamic analysis of the correlation in return. In our analysis, we use the Engle-Granger Testing Procedure for testing the presence of co-integration among the stock prices. Suppose Y_t and Z_t are two $I(1)$ variables, Engle-Granger proposes a straightforward test whether the two $I(1)$ variables are co-integrated. The test is carried out in two steps:

Step 1: Pre-testing the variables for their order of integration.

Co-integration necessitates that the variables be integrated in the same order. Thus the first step in the analysis is to pre-test each variable to determine its order of integration. For this, we perform the Augmented Dickey-Fuller (ADF) Tests and Phillips-Perron (PP) Tests.

Step 2: Estimating long-run equilibrium relationship.

If both the variables are integrated in the same order, the next step is to estimate the long-run relationship of the form:

$$Y_t = \beta_0 + \beta_1 Z_t + e_t$$

To determine if the variables are co-integrated, the residual sequence from this equation is denoted as $\{e_t\}$. Thus $\{e_t\}$ is a series of the estimated long-run relationship. If these deviations from long-run equilibrium are found to be stationary, then Y_t and Z_t sequences are co-integrated of order $(1,1)$.

To test the stationarity of residuals, we can apply 2 methods -

- (i) Apply ADF and PP tests
- (ii) Alternatively, observing D-W Statistics from co-integrating regression

$$DW = \frac{\sum(e_t - e_{t-1})^2}{\sum(e_t)^2}$$

$$\sum(e_t)^2$$

If $\{e_t\}$ is random walk, the expected value of $(e_t - e_{t-1})$ is zero and so DW statistics is close to zero.

Auto regression equation of residuals can be written as:

$$\Delta e_t = a_1 e_{t-1} + \varepsilon_t$$

Our parameter of interest is α_1 . If we cannot reject the null hypothesis $\alpha_1=0$, we conclude that the residual series has unit roots. In other words, if it is not possible to reject the null hypothesis $\alpha_1=0$, we cannot reject the hypothesis that the variables are not co-integrated.

V. Empirical results:

Results from the correlation analysis

Table 1

Correlation matrix is obtained for the price indices of the countries considered:

	BSE	DJIA	FTSE	HANG
<i>BSE</i>	1.000000	0.412120	0.486365	0.694508
DJIA	0.412120	1.000000	0.915842	0.646019
FTSE	0.486365	0.915842	1.000000	0.699341
HANG	0.694508	0.646019	0.699341	1.000000

From the table it is clear that BSE Sensex is highly correlated with Hang Seng (0.694508); whereas the correlation between Sensex and DJIA and between Sensex and FTSE is low. DJIA is highly correlated with all other stock indices except Sensex, with the highest correlation with FTSE (0.915842). The same observation is made for FTSE. Hang Seng on the other hand is highly correlated with all other stock indices.

Results from the co-integration analysis

Table 2

ADF Test and PP Test performed on the stock price indices of four countries suggest that the series are integrated of order

	ADF Test Statistics (Critical Value -3.4466)	PP Test Statistics (Critical Value -3.4455)
BSE	-4.898794	-11.02662
DJIA	-5.587330	-12.15798
FTSE	-4.935510	-11.36321
HANG-SENG	-5.737997	-11.46347

Perform the Engle-Granger co-integration test on the four series of stock price indices, taking each as a dependent variable, dependent on other variables, a constant term and a residual. The residual from each equation is further tested for stationarity. We also note down the D-W Statistics from each regression equations.

Table No.03

The results that we obtained are as follows:

Results From Engle-Granger Co-integration Test	
Dependent Variable	Test Statistics for Residual (Critical Value -1.9425)
BSE	-2.902335
DJIA	0.6523
FTSE	-0.220722
HANG	-2.321824

From the above table, we can say the null hypothesis H_0 : no co-integration is rejected for BSE and HANG and is accepted for DJIA and FTSE. Thus it seems to suggest that there is integration in the stock markets of India and Hong Kong whereas markets are not integrated into the case of USA and UK.

Inferences

Financial markets have become increasingly global. In the globalised financial market, the main challenge for both investors and policymakers is to take advantage of and promote efficiency-enhancing aspects of market interaction, while containing and controlling the undesirable destabilising effects. Various factors influence market interaction and hence the integration of financial markets like an institutional framework of the economy, governmental policies and technological advancement of the country. These factors are incumbent on market efficiency and the transaction costs of diversification. Several studies conducted on integration assert that openness of capital markets is a prerequisite for market integration because it increases market efficiency and lowers the transaction costs.

Table No.04
HANG-SENG

	ADF statistics	99% Critical Value	95% Critical Value	90% Critical Value	Result
DJI A	-2.17	-2.5823	-1.9425	-1.8171	Co-integrated
FTS E	-2.2885	-2.5823	-1.9425	-1.8171	Co-integrated
BSE	-2.0525	-2.5823	-1.9425	-1.8171	Not co-integrated

From the correlation table-1, it is observed that the correlation coefficient between Hang Seng and other stock indices is quite high (Hang Seng-FTSE=0.699341, Hang Seng-DJIA= 0.646019 and Hang Seng-BSE 0.694508). The co-integration results also support the fact that the Stock Exchange of Hong Kong is integrated with the equity markets of the developed countries UK and the USA. The reason for this can be attributed to the liberalised and free trade regime in the country. Local investors contributed only half of the market turnover whereas the international participants continue to take a bigger share. In 1996, almost 70% of the foreign investment came from the USA and UK. Thus, the absence of restrictions on the entry and exit of foreign investors results in the lack of arbitrage opportunities in the long run and strengthens the integration of one market with the other markets.

Table No.05
BSE Sensex

	ADF statistics	99% Critical Value	95% Critical Value	90% Critical Value	Result
DJIA	-2.84727	-2.5823	-1.9425	-1.8171	Co-integrated
FTSE	-2.855664	-2.5823	-1.9425	-1.8171	Co-integrated
HANG	-2.898759	-2.5823	-1.9425	-1.8171	Co-integrated

BSE Sensex on the other hand shows a low correlation with all the other indices. However, co-integration results reveal that the Indian equity market is integrated with all the other markets of the world. India is still in the intermediate stage of development. Before 1993, even the domestic financial markets were fragmented. However, post-1992, the government undertook financial liberalisation in the form of

deregulation, privatisation and implementation of pro-market-oriented policies. The Indian government began the process of integration of its financial markets with global finance capital in two major ways. Firstly, by permitting foreign institutional investors to enter its capital markets and secondly, by allowing domestic companies to raise capital from abroad through the issuance of equity, Global Depository Receipts (GDR) and other debt instruments. All these policies have contributed towards increasing the domestic as well as global financial integration of India. Studies have revealed that countries with a relatively greater number of restrictive entry barriers are less responsive to global shocks than countries with fewer restrictive entry barriers. Thus gradual phasing out of restrictions can explain the movement of the Indian equity market in tandem with the world markets in long run. The high correlation coefficient between the stock indices of the two developed countries- the UK and the USA (0.915842) is not surprising. Both countries are identical in terms of technological and institutional advancements and have liberal regimes and pursue common macroeconomic policies.

Table No.06**DJIA**

	ADF statistics	99% Critical Value	95% Critical Value	90% Critical Value	Result
HANG	-1.163406	-2.5823	-1.9425	-1.8171	Not co-integrated
BSE	-1.035747	-2.5823	-1.9425	-1.8171	Not co-integrated

Table No.07**FTSE**

	ADF statistics	99% Critical Value	95% Critical Value	90% Critical Value	Result
HANG	-1.472144	-2.5823	-1.9425	-1.8171	Not co-integrated
BSE	-1.158915	-2.5823	-1.9425	-1.8171	Not co-integrated

The equity markets of the USA and UK are well developed and integrated well with other domestic sectors and the volume of trading is also very high. Hence, their markets are unperturbed by the disturbances in other markets. However, any disturbance occurring in the former is absorbed by the markets of the less developed and emerging countries. Empirical studies conducted along these lines also support this fact. A paper by Botha and Apostolellis says that “application of the impulse response functions reveals that the US is the dominant market and that all responses to shocks in the US market are

absorbed by the emerging markets rapidly this analysis however indicates that the converse does not hold.”

V. Discussions of the study:

1. Hang Seng seems to be the most volatile index of the four whereas Sensex seems to fluctuate along a linear trend. Studies show that integration brings about an equity market, which is significantly larger, and more liquid than before and stock returns which are more volatile and more correlated world market returns than before because investors flock in to benefit from asset diversification.
2. On the other hand, DJIA and FTSE exhibit co-movement for the entire period under consideration and are less volatile. This strengthens our assertion that these markets are more affected by domestic factors.
3. The markets seem to move in tandem- especially during major world shocks. The period of the East Asian Crisis is responsible for the sharp decline in Hang Seng from 1997-1999. The fact that the other indices declined at the same time supports the integration hypothesis though the trough is not so prominent. If we consider the shock arising in the USA due to the terrorist attack on 9 September 2003, it is evident that the dip in the Hang Seng and DJIA was almost identical. Thus we can conclude that the biggest shocks in the equity market of the USA are domestic and no shocks in other markets seem to affect the US. On the other hand, a shock in the US market is quickly absorbed in the market of Hong Kong. This shows the absence of one-to-one correspondence between the markets of developed and emerging countries. The former affects the latter but not vice-versa.

VI. Conclusion:

Conclude the existence of perfect total integration among the world markets given the limitations of our analysis. However, we can unambiguously assert that over time, with the opening up of economies and integration and strengthening of domestic financial markets, the benefits from asset diversification are getting exhausted. In the short run, an investor might make some windfall profits due to lag in the transmission of shock from one market to the other but in the long run, such opportunities are getting eroded.

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TRIUMVIRATE OF SOCIAL JUSTICE: BUDDHA, BASAVESHWARA AND AMBEDKAR

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I. Abstract:

The present study aims to unfold the social injustice and struggle of common man Dalits and marginalized who have been suffering for ages. Their passion to liberate themselves from the dungeon they motivated by these trio of Buddha, Basweshwara and Ambedkar, some of them followed their teachings minutely and practiced in their day-to-day lives and liberated themselves from the gutter i.e (inhuman and outdated customs). Some of them are following them partially they are progressing gradually and some of them are neglecting their ideas and themselves accustomed to living in darkness they possessed a strong bond toward bad customs and outdated rituals their attitude towards progress is passive therefore they are still leading miserable and filthy life. Due to their feeble and orthodox god-fearing living style, their social condition deteriorated and remained marginalized. They are not adopting and practicing the rational ways for progress so, in a way they are bringing on themselves this is a hard fact nobody can deny. Moreover, the majority of high-class and rich people have a negative attitude towards the marginalized and downtrodden. Therefore India is lagging despite its rich heritage, fabulous natural resources and gifted sages and rishi, munis. These three superhuman beings sacrificed their lives to liberate these people from the dungeons and paved the way for the entire human being's welfare. They preached universal love, compassion, and liberty equality, fraternity to build a peaceful and egalitarian society. The trio Buddha, Basveshwara and Ambedkar, were great revolutionary thinkers who believed in a just, egalitarian and rational society, where all the sections of the society's men and women should have equality and dignity .they were the harbinger of social rebel epoch-maker who sacrificed their lives for the betterment of the mankind .their yardstick to measure a good human being is not a caste, creed, low or high his /her conduct and work. They strongly condemned the vices and heinous evil selfish practices, which were prevalent in the guise of the infinite numbers of the society they rationally, unfolded the true and righteous nature of religion. Their love and compassion are not limited only limited for human beings but also the all creatures e.g. birds, animals etc. Their hearts were filled with the milk of human kindness.

So, how these unique souls have struggled to restructure Indian society is essential to introspect ourselves and more important to put into practice.

Keywords: Justice, liberate, Compassion, Egalitarian

II. Introduction:

The word justice has been derived from the Latin words 'jungere' (to connect or bind together) and 'jus' (a bond or tie) which mean 'to give an individual his or her equal due share'. In modern times, Justice means the existence of those social conditions by which a harmonious and right coordination is made between an individual's conduct and the conduct of fellow individuals in the society leading to the welfare of the society at large. Justice should concern itself with the fulfillment of the aspirations of all the sections of the people living in a country. Justice has been defined by various thinkers, social reformers, and philosophers in their ways depending upon the social conditions, customs and traditions prevalent in those days. According to Plato, justice is a 'human virtue'. It is the social consciousness that makes a society internally harmonious and sound. Socrates, the great Greek philosopher, has explained what justice means; 'Justice does not only mean doing good to our friends and harm to our enemies or pursuing our interest, but it involves the well-being of all people. According to J. S. Mill, Justice implies something which is not only right to do and wrong not to do but which some person can claim as his moral right. Jimmy Carter opines 'We know that a peaceful world cannot long exist with one-third rich and two-thirds hungry'. Social justice generally refers to the idea of creating an egalitarian society that is based on the principles of equality and solidarity that understand and values human rights. Definition of social justice: social justice is the type of justice rooted in the idea that all people should have equal rights, opportunities and treatment. Social justice refers to a political and philosophical theory that focuses on the concept of fairness in relations between individuals in society and equal access to wealth, opportunities, and social privilege. Several attempts were made by social reformers to promote egalitarian societies and reduce the exploitation of certain marginalized groups due to the vast disparity between the rich and the poor in their respective era. Despite their Herculean efforts, they couldn't succeed in their missions as they expected and hoped, but the impact of their missions on society was tremendous. Justice has been defined by various thinkers, social reformers, and philosophers in their ways depending upon the social conditions, customs and traditions prevalent in those days. "A just society is that society in which ascending sense of reverence and descending sense of contempt is dissolved into the creation of a compassionate society"- B. R. Ambedkar. "Justice is the first virtue of social institutions."- Jhon Rawls. Today, justice in the present time social justice has shifted towards a stronger emphasis on human rights and improving the lives of disadvantaged and such as sex, age, wealth, ethnicity, heritage, social status,

religion, and others. Social justice often marginalized groups that have historically faced discrimination in society. Many of these groups have been discriminated against based on factors that lead to efforts to redistribute wealth to some of the underprivileged groups through providing income, jobs, and education support and opportunities. Justice has been defined by various thinkers, social reformers, and philosophers in their ways depending upon the social conditions, customs and traditions prevalent in those days. Mark Twain, the father of American literature, and one of the celebrated writers of the modern age, glorified India as "... the land of fabulous wealth and fabulous poverty India is the cradle of the human race, the birthplace of human speech, the mother of history, the grandmother of legend, and great grandmother of tradition. Land of Rishis and Maharishis, land of Buddha and Mahavira, Our most valuable and most artistic materials in the history of man are treasured up in India only!". It is pedantically said that India has a great cultural heritage rich civilization and unique phenomenon in many ways. But, very viciously some evil practices are not brought forefront deliberately it is not portrayed as it has been. We skillfully tried to conceal the real Indian great culture is coupled with inhuman practices, such as casteism, community hierarchy, and gender inequality thus, this is great India how alien people are glorified, on going through this quote every Indian chest swells with pride, and on contrary it is an excruciating pain to everyone or who are conscious. Because the reason is very obvious in course of time we lost our glory and freedom. The high-caste people mischievously created some scriptures which led to bifurcating the society into various caste classes and creeds. They enjoyed certain privileges and created rifts among the people. Thus, this is a great debacle in India. Justice has been defined by various thinkers, social reformers, and philosophers in their ways depending upon the social conditions, customs and traditions prevalent in those days. In ancient India social justice was inconceivable and the idea of equality was considered subversive. However, during the Buddhist period, when Buddha preached the casteless society based on the noble eightfold path, the concept of casteless society began to emerge.

Objectives:

- To eradicate untouchability, exploitation, slavery, , superstitions, racial discrimination etc.
- To bring to forefront the evil of caste tyranny and its dehumanizing effect on downtrodden and marginalized people in general and dalits in particular

The present article aims to explore philosophical as well as social problems of Indian society, which may prove fruitful to scholars as well as to the young generation which is eager to find solutions to the national problems on a rational basis out of various kinds of evils such as caste, creed, sect, religion and race, this is the burning issue which our society, despite several efforts made by great social reformers, has not been able to address. It is imperative to analyze these issues and establish the causes of these maladies. We had hoped that after independence and the formation of self-government following the implementation of our

constitution, these evils would be eradicated, but It is quite evident that we have failed to achieve the desired success in this matter. About 2500 years ago the Buddha questioned the caste divisions in India. He said "The only valid divisions are the divisions between those who are noble and wholesome and those who are ignoble and unwholesome. Lord Buddha was a great humanitarian and harbinger of social reforms. Gautama Buddha, also known as Siddhārtha Gautama, Shakyamuni Buddha, or simply the Buddha, after the title of Buddha, was an ascetic and sage, on whose teachings Buddhism was founded. Siddhartha Gautama was a wealthy prince, born in what is today northern India in about 563 BCE. As a prince, Siddhartha was surrounded by luxury: servants, palaces, silken robes, and jewellery made of gold, silver, and precious stones. The metal-and-jewel earrings were very heavy and stretched his earlobes. Despite all this comfort and sophisticated life Buddha left home to search true meaning and essence of life. By dint of firm determination and a holistic approach, he became enlightened one i.e (Buddha). Buddha's wisdom is broad as the ocean and his spirit is full of great compassion. Buddha has no form but manifests himself in exquisiteness and leads us with his whole heart of compassion. Buddha preached to us "Just as the waters of the different rivers lose their names and separateness when they flow into the mighty ocean, so are varna, caste, creed, ranks and state forgot when the followers of the Buddha join the order of monks that is Sangha". Buddha's teachings are known as "Dhamma" he taught that wisdom, kindness, generosity, patience, and compassion are important virtues. Buddha's Dhamma was based on doctrines that are rationally possible. In no other religion at the values of knowledge and evil of ignorance so much insisted upon as they are in Buddhism, His religion had the glory of having rightly judged the intrinsic greatness of man's capacity to work out his salvation without any extraneous aid, and of having perceived that far more of the world's misery is caused by stupidity and blind faith without any stress on knowledge. The Basic Teachings of Buddha which are core to Buddhism are The Three Universal Truths; The Four Noble Truths; and • The Noble Eightfold Path. Gautama Buddha was about preached peace, harmony and co-existence. But today, there are still forces whose existence depends on spreading hate, terror and mindless violence. He said such forces do not believe in liberal democratic principles and thus gave a call for all those who believe in humanity to come together and defeat terror and radicalization. Lord Buddha's teachings and the importance given to social justice can become a global unifying force. Lord Buddha and to reflect on the noble ideals and sacrifices he made for the betterment of our planet. These stories about the life of Lord Buddha inspire us to maintain our calm in the face of adversity and in times of crises the message of Lord Buddha is very relevant in these trying times and patience and calmness of mind can help to overcome even the biggest of challenges. These stories about the life of Lord Buddha inspire us to maintain our calm in the face of adversity and in times of crisis. The message of Lord Buddha is very relevant in these trying times and patience and calmness of mind can help to overcome even the biggest of challenges. Today is the day to assimilate the thoughts of Buddha and adopt

them into our life. Let us pledge to truly put the Eightfold Path into practice and conduct our daily lives accordingly. He was never taught to hate other religions. He ruled the world without war, without forcibly imposing religion on others. He always lived like a common man. Unlike other religions, the Buddha does not believe in who is the doer. Buddha was a unique man. The Buddha has given a straightforward way of life. For the lay followers for his lay followers (those who do not join the sangha), the Buddha prescribes the Five Precepts (PanchaSilā) as the minimum moral obligation for living a harmonious life in the secular society. After Buddha, Basaveshwara in the 12th century raised his voice against the caste system. He fought for equal status of both men and women and attempted to establish a society based on Humanism, raised his voice against the caste system and inequality and emerged as a strong advocate of the principle of Humanism. The 12th century witnessed a movement for the eradication of discrimination. Basava Philosophy is the collective principles of Basaveshwara, which shares the philosophy for building a 'Welfare State' through educating the society with moral values and culture. These principles generally suggest that people practice socially responsive behaviours to overcome social challenges. Basava Philosophy is found in the field of literature, spirituality, human values and rights. LORD Basava was the progenitor founder of the Lingayat religion tradition within Shavism – Veershaivism. It is an independent egalitarian movement that sourced its inspiration from the larger and much older frameworks of Bhakti traditions in South India. Veerashaivism's revolution was as much social as it was spiritual. Basaveshwara set his example by rejecting the ritual-ridden Vedic religion in favour of Veerashivism, an emerging vibrant religion having a great concern for mankind as a whole including the ill-treated, exploited and downtrodden class of untouchables refusing to undergo the thread ceremony, Basaveshwara championed the revolution at the grass root level. Basava philosophy is the collective principles of Basaveshwara, which shares the philosophy for building a 'Welfare State' through educating the society with moral values and culture. These principles generally suggest that people practice socially responsive behaviours to overcome social challenges. Lord Basava was primarily a social rebel and a great revolutionary thinker who believed in a just, egalitarian and rational society, where people of all castes, religions, creeds, sects, and occupations must have equality and dignity. He propagated universal brotherhood, love, compassion and equality. He not only helped to remove superstitions and ignorance but also tried to restore Hindu philosophy to its pristine glory. Basaveshwara championed the revolution at the grass root level. Basaveshwara did not care for the caste in which a person was born. He recognized the character, conduct and action of the person. He believed that human beings share with all animals the need for sustenance and with many animals the capacity to enjoy pleasure and suffer pain. Hence, he said, those who have kindness for humanity should be regarded as highborn. Men are known for their actions. Not by their birth. Vachana (literally, that which is said) form the backbone of the Veershaiva religious canon. Though this genre of poetry predates the inception of Veershaivism itself, it does owe most of its flourish to the

works of Lingayat saints such as Allama Prabhu, Akka Mahadevi, Basavanna and Dasimayya. Vachanas are written in Kannada by the common folk. The Vachanas are free verse poems that reject any pretence of a metre for their lines or the stanza form for the verses. Vachana literature mainly concentrates on righteousness, ethics, spiritualism, compassion, self-reliance, love and affection towards fellow human beings etc. Basava and his followers use Vachanas as a weapon to protest against social evils and anarchy. They wrote vachanas using their mystic power and experiences. Every experience that each Sharana acquired was churned at the Anubhavamantapa, and then it was poured forth into the vachanas for the use of mankind. The vachanakars, who had come from various strata of society and wrote according to their respective dialect and social milieu,. This literature stirs the soul of the readers and elevates and mesmerizes them with its latent knowledge. Its universal values can be used as beacon lights or remedies for social evil maladies. The Anubhava Mantapaparliament(or, the “hall of spiritual experience”), believed in the principle of the divinity of labour. Members of the Anubhava Mantapapractised their professions, such as that of washerman, Gunddyapotter and the like. Machayya, Kakkayya Dhor, Channayya, and Ambigar Choddayya [boatman] were engaged in their respective occupations and yet became great persons. The Anubhava Mantapa did not attach importance to the caste or class in which a person was born. Basavanna spread social awareness through his poetry Basavanna spread social awareness through his poetry, popularly known as Vachanaas and exploitations that were prevalent in the guise of Chaturvarnya or the four-fold division. Basaveshwara's teachings have great significance in modern times. Thus he condemned the caste-ridden society and raised his voice of protest stoutly against the fourfold division of the Hindu Society. Love and compassion are the watchwords of his philosophy and religion. All his social and religious reforms were based on this compassion and all-embracing love for humanity. It was a remarkable achievement that Basava boldly threw open the same social and religious opportunities to all without any distinction of caste, creed or sex. Basavanna played a crucial role in ensuring social justice and equality. He taught the world the concept of social equality in the 12th century itself. He wanted to bring the last man of society to the mainstream. Bodhisattva Bhartratna Dr. BABASAHEB A MBEDKAR (1891- 1956), M.A., M.SC, PHD, DSC, D.Lit, LLD, BAR AT LAW, a Symbol of knowledge was one of the six brains in the world. Dr B.R. Ambedkar, the founding father of modern India, the national leader, valiant fighter, foresighted visionary, a versatile genius, a luminous star in the galaxy of celebrated supermen, the immortal star was born on 14 April 1891. The greatest liberator ever born in the world was rightly called the symbol of revolt, the Chief Architect of the Indian Constitution, a scholar par excellence, a philosopher, a visionary, an emancipator and a true nationalist, Multifaceted erudite scholar, a staunch follower of peace and harmony. He emancipated millions of downtrodden, untouchable, marginalized and destitute people of India without shedding a single drop of blood and now he is a living spirit, a lighthouse, a messiah, and an inspiration

for the whole world. He was the first Doctor in the world who put life into the dead, the meek, the submissive, and the downtrodden. He injected revolutionary thoughts and, elixir into their minds and bodies and made them aware of their responsibilities, rights and self-esteem for this he sacrificed his invaluable life. He struggled throughout his life to forgo all the comforts of his life that he was entitled to bring into the mainstream of society. He was, above all, a man of character and wisdom. He could turn impossible into possible. He was the beacon light, a symbol of the struggle for social justice. Dr Ambedkar's writings are as relevant today as they were at the time when he penned them. He firmly believed that our political democracy must stand on the base of social democracy which means a way of life that recognizes liberty, equality and fraternity as the principles of life. He shook the very foundation of Hinduism and uprooted 5000 years of dogmatic, evil practices which were the root causes of India's downfall. He was a versatile genius, who observed very keenly the main causes of India's vulnerability to discriminatory evil practices that had ridden Indian society and led to slavery. He propounded the unification of society, social harmony and a casteless society where every individual can lead a smooth and peaceful life irrespective of caste, class., creed, high and low class. According to him, if we want to have a sustainable democracy, not merely in form, but also reality, we must hold fast to constitutional methods of achieving our social and economic objectives. His life was a great saga of suffering, sacrifice and struggle. His birth as an untouchable gave him a bitter taste of caste tyranny, oppression and unbearable agony. He was a fighter for the dignity of man and the deprived people. His life was that of a struggling champion of human rights. So obviously he was a great thinker of women and their rights. Being a pioneer of social justice, he always worked for women's emancipation. His principal aim was to build a society based on equality and social justice. To fulfill his dreams, he advocated that everybody should be equal irrespective of caste, creed, gender and religion. The Nobel Laureate Dr Amartya Sen glorifies Babasaheb Ambedkar As "Ambedkar is my Father in Economics. But some myopic, sluggish, malaperts call him simply a leader of the Dalit which is grossly unfair. He advocated that in our political, social and economic life, we must have the Principles of one man, one vote and one value irrespective of caste, color race, gender, creed Religion and place. "Justice" for Ambedkar is simply another name for Liberty, equality and fraternity. This forms the cornerstone of Ambedkar's concept of social justice. It upholds the dignity of human personality. Dr Ambedkar's writing is as relevant today as was at the time when it was penned he firmly believed that our political democracy must stand on the base of social democracy which means a way of life that recognizes liberty equality and fraternity as the principles of life. According to him if you want to maintain democracy not merely in form, but also reality, we must hold first to constitutional methods of achieving our social, political and economic objectives. He advocated that in our political, social and economic life, we must have the principles of one man, one vote and one value irrespective of caste, color race, gender, creed, religion and place. The Indian society owes

a tremendous debt to his radical and humanitarian approach to the solution of the problems of the Backward Classes. Dr Ambedkar dedicated his whole life to uplifting the downtrodden who have been suffering for ages. Dr Ambedkar's analysis of Hindu Philosophy is intended not as an intellectual exercise but as a definite approach to the strengthening of Hindu society based on the human values of equality, liberty and fraternity. The analysis ultimately points towards uplifting the downtrodden and absorbing the masses in the national mainstream. A democrat par excellence, he firmly believed that "democracy means a form and method of government whereby revolutionary changes in the economic and social life of the people are brought about without bloodshed." Therefore, he urged the people to adopt constitutional methods and abandon the path of violence to bring about radical changes in society. Dr Ambedkar was fully conscious of the fact that law alone cannot change human societies. He had all praise for the addictiveness and spirit of assimilation which existed in the Hindu society and culture but what concerned him was the inequality that was structured in the social attitude of the followers of Hinduism. The 'untouchables' of India have been treated as the beast of burden since the time of the law-giver Manu or even earlier. Thanks to the efforts of the Government of independent India as well as the concerned individuals and organizations to eradicate untouchability, today the common man has come to realize that this nation cannot afford to remain divided into narrow caste and community lines. Dr Babasaheb Ambedkar gave another thrust when he asked his countrymen to make some introspection on the problem of untouchability. He asked the basic question: "Does the motherland belong to the untouchables?" Dr Babasaheb Ambedkar had already thought about this disturbing problem and he had also thought about its remedies. The remedies, however, were equally harsh. Dr B.R. Ambedkar was a many splendored personality—a jurist with encyclopedic knowledge, an astute thinker, a prolific writer, a 'constitutional pandit, and a political leader with a charismatic personality. It would, however, be as a militant reformer, a compassionate social rebel, and a liberator of the downtrodden masses that he would be long remembered.

III. Conclusion:

With the help of this article author dealt attempt to bring out the evils of casteism to the forefront and its devastating effect on the marginalized Dalits and poverty-stricken masses and their sufferings, anguishes, tyranny, sorrow, poverty, hunger, heart-rending, nightmarish experiences, their struggle to break down the wicked mechanism of the caste system, and liberate themselves, paving the way to a better peaceful and meaningful life. Inspired by this trio and trying to emerge from the clutches of python which has coiled around them for ages. For the betterment of society, dissemination of the legacy of these giants is a beacon light and balm for the modern frustrated and confused humanity. By propagating the philosophy and preaching of these three superhuman beings we can lend impetus to social progress. We are living in

the post-modern and scientific age and we are boasting about achievements and inventions by the scientists and theories of the philosophers, but we failed to live like a human beings on this earth. Despite several efforts have been made to annihilate the evils in society, we failed to achieve the desired goal.

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सामाजिक परिप्रेक्ष्य में नागार्जुन की कविताओं की प्रासंगिकता

डॉ. शिराजोदीन

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I. शोध सारांश :

हिंदी के प्रगतिवादी कवियों की श्रेणी में नागार्जुन का विशिष्ट स्थान रहा है। जनवादी विचारधारा के समर्थक बाबा नागार्जुन राजनीतिक रूप से साम्यवादी विचारधारा के पोषक एवं पक्षधर थे। दरअसल इनकी ज्यादातर कविताओं में सर्वहारा समाज की सच्चाई को उजागर करने का प्रयास किया गया है। साथ ही आक्रोश, व्यंग्य, सहजता एवं व्यवस्था के प्रति ललकार की अभिव्यक्ति भी हुई है। नागार्जुन ने न केवल शोषण व अत्याचार करने वाली ताकतों को चुनौती देते हुए उन ताकतों का पुरजोर विरोध किया है बल्कि शोषित समाज के प्रति सहानुभूति भी प्रकट की है। समाज के पीड़ित व शोषित वर्ग को स्वर प्रदान कर नागार्जुन ने जन कवि के उत्तरदायित्व को बखूबी निभाया है। बाबा नागार्जुन अपने जीवन में सत्ता, व्यवस्था एवं पूंजीवाद के प्रति आक्रोश व्यक्त करने में हमेशा आगे रहे। इसकी कविताओं में आज़ादी का असली चेहरा उभरकर सामने आया है। दरअसल भारत की जनता ने आज़ादी का जो सपना देखा थाकपड़ा और मकान की ,जिसमें सभी के लिए रोटी, ,प्राथमिकता थी वह साकार नहीं हुआ। बल्कि परिस्थितियाँ और भी गंभीर होती गईं। आज़ादी के कई साल बाद देश का बड़ा हिस्सा भूखमरीबेघर आदि से पीड़ित था। इन परिस्थितियों को उजागर करने के ,बेरोजगारी , सन्दर्भ में नागार्जुन की कविताएँ प्रमुखरही हैं। कवि नागार्जुन की राजनीतिक समझ और सत्ता से मुठभेड़ इनकी रचनाओं में दिखाई देता है। इस संदर्भ में बाबा नागार्जुन के बारे में डॉ. विलास त्रिपाठी के विचार साझा करना प्रासंगिक होगा। उन्होंने लिखा था' -नागार्जुन दलितों, शोषितों, के उद्धार के लिए राजनीति करतेहैं तो उनकी कविता भी उन्हीं को समर्पित है।' यह कहना उचित होगा कि वर्तमान समय में भी इनकी कविताओं की सामाजिक प्रासंगिकता बनी हुई है।

बीज शब्द : प्रगतिवादी कवितासामाजिक , परिप्रेक्ष्य,राजनीतिक व्यवस्था, सत्ता तथा पूंजीवादी व्यवस्था पर व्यंग्य आदि।

II. शोध आलेख :

नागार्जुन की कविताएँ आज़ाद भारत के जन-संघर्ष एवं राजनीतिक चेतना का दस्तावेज हैं। इस कवि ने आज़ाद भारत की फटेहाली के लिए न केवल राजनेताओं को जिम्मेदार और कठघरे में खड़ा किया बल्कि आर्थिक व्यवस्था और शोषणमुक्त समाज की स्थापना ही इनका मुख्य लक्ष्य था। नागार्जुन अपनी कविता में उस भारतीय समाज की कामना करते हैं जिसमें-

‘व्यक्ति-व्यक्ति में नई चेतना संचारित हो

सुख-सुविधा का और शान्ति का सम अवसर हो

सभी के लिए।’

नागार्जुन की कविता की मूल ताकत जनता की शक्ति में निहित है। इसी जन-बल की ताकत पर ही शासक एवं शोषकों से टकराती है, उनके छल-छद्मों को उजागर करती है। उनपर तीव्र प्रहार करती नज़र आती है।

नागार्जुन के काव्य में जनता भूखी तो है लेकिन डरपोक नहीं, शोषित-पीड़ित तो है लेकिन पस्त नहीं।

‘गोबर, मंहगू, बलचनमा और चतुरी चमार

सब छीन ले रहे स्वाधिकार।’

नागार्जुन सर्वहारा वर्ग के प्रबल पक्षधर हैं। दुनिया के किसी भी कोने में स्वाधिकार के लिए संघर्ष करती शोषित एवं विद्रोही जनता को वे सहानुभूति स्नेह के अपने स्वर से शक्ति प्रदान करते हैं। चाहे वियतनामी जनता का मुक्ति-युद्ध हो या नेपाल का संघर्ष या नीग्रो संघर्ष। निम्न मध्यम वर्ग के जीवन को उत्तरोत्तर जर्जर करने वाली इनकी कविता पूंजीवादी सर्वत्र अपने कड़े लेखन और प्रतिहिंसा के स्थायी भावको प्रस्तुत करती है-

‘नफरत की अपनी भट्टी में

तुम्हें गलाने की कोशिश ही

मेरे अन्दर बार-बार ताकत भरती है

प्रति हिंसा ही स्थायी भाव है मेरे कविका।’

नागार्जुन ने हमेशा वर्ग-वैषम्य, अंतर्विरोधों और व्यंग्य के माध्यम से सामाजिक यथार्थ को प्रस्तुत किया है। आजादी के बाद भी देश की प्रगति के रुके रह जाने का मूल कारण सामंतवादी और सुविधा प्राप्त वर्ग है। जमींदारों और पूंजीपतियों का उत्पादन और उत्पादन के साधनों पर अधिकार होता चला गया। ऐसी परिस्थिति में गरीब और ज्यादा गरीबी की मार सहता गया।

‘खादी ने मल मल से सांठ-गांठ कर डाली है

बिड़ला, टाटा और डालमियां की तीसों दिन दीवाली है

जोर-जुल्म की आंधी चलती,

बोलन हीं कुछ सकते हो,

समझ नहीं पाता हूँ कि

हुकूमत गोरी है या काली है।’

नागार्जुन खुद हमेशा गरीबी की मार से त्रस्त थे। इसलिए उनकी कविताओं में गरीबी, आर्थिक विषमता आदि को अभिव्यक्ति मिली है। स्वार्थी पूंजीपति वर्ग और उसकी शुभचिंतक सरकार पर व्यंग्य करते हुए वे कहते हैं-

‘निम्न वर्ग की आंत काटकर

नसों दूहकर मिडिल क्लास की

रखो ठीक बैलेंस, बल्कि कुछ बचत दिखाओ

छोटे बड़े

मगरमच्छों को अभयदान दो

धन्वंतरियों के उन अगणित

अमृतघतों पर, देखो कोई नज़रन डालो।’

नागार्जुन चाहते थे कि सबको रोजगार के अवसर मिलें, सबकी गरीबी दूर हो और उनके अनुसार इसका समाधान औद्योगीकरण से ही सम्भव था। श्रम की महिमा पर बल देते हुए वे कहते हैं-

‘सर्वसहनशीला अन्नपूर्णा वसुंधरा। स्तुति नहीं

श्रम कठोर मांगती है। सजती आई है सदा से धरती

कर्षण विकर्षण सिंचन परि सिंचन।'

भारतीय जनता के दुखों की सच्ची अनुभूति, जनता की पीड़ा का गहरा बोध तथा नेताओं एवं देश की यथार्थवादी तस्वीर को प्रस्तुत करते हुए नागार्जुन कहते हैं-

'भटक गया है देश दलों के बीहड़ वन में

कदम-कदम पर संशय ही उगता है मन में

नेता क्या है, निज-निज गुट के महापात्र है

राष्ट्र कहाँ है, शेष-शेष बस राज्य मात्र है।'

'खिचड़ी विप्लव देखा हमने' संकलन अपने दौर की राजनीतिक परिस्थितियों, राजनीति के पतन का ज्वलंत दस्तावेज है। इसमें मोरारजी, जयप्रका शनारायण, चौधरी चरणसिंह और संजय गांधी से लेकर इंदिरा गांधी तक पर व्यंग्यात्मक कविताएँ लिखी गई हैं।

'पकड़ो, पकड़ो, अपना ही मुंह आपन नोचे!

पगलाई है, जाने, अगले क्षण क्या सोचे!

इस बाधिन को रखेंगे हम चिड़िया घर में

ऐसा जन्तु मिलेगा भी क्या त्रिभुवन भर में!'

इंदिरागांधी द्वारा अपनी महत्वाकांक्षाओं के आगे अपने पिता के सुकर्मों पर पानी फेरे जाने को वे इस तरह व्यक्त करते हैं-

'इन्दुजी, इन्दुजी, क्या हुआ आपको?'

सत्ता की मस्ती में, भूल गई बाप को?

बेटे को तार दिया, बोर दिया बाप को!

क्या हुआ आपको ? क्या हुआ आपको ?

छात्रों के लहूका चस्का लगा आपको

काले चिकने माल का मस्का लगा आपको

किसी ने टोका तो ठस्का लगा आपको

अन्ट-शन्ट बक रही जनून में

शासन कान शाघु लाखून में

फूल से भी हल्का

समझ लिया आपने हत्या के पाप को

इन्दुजी, क्या हुआ आपको

बेटे को तार दिया, बोर दिया बाप को!

वहीं दूसरी जगह वे कहते हैं-

‘दया उमड़ी, गुल खिले शर-चापके

लाइए, मैं चरण चूमू आपके

किए पूरे सभी सपने बाप के

लाइए, मैं चरण चूमू आपके।’

मोरार जी देसाई के लिए ‘भाई भले मोरार जी’ कविता का यह अंश देखिये-

‘हाय तुम्हारे बिना लगेगा सुना यह संसार जी

गिरवी कौन रखेगा हमको सात समंदर पार जी’

भारतीय राजनीति का इतिहास रहा है कि वह अपनी राजनीतिक रोटियाँ सेंकने के लिए जनता और समाज को असली मुद्दों से भटका कर भाषा, जाति, धर्म, क्षेत्र आदि पर बांटती है। ऐसे सत्ता के भूखों पर और पार्टियों पर नागार्जुन करारा प्रहार करते हैं।

‘श्वेत श्याम रतनार अँखियाँ निहार के

सिंडीकेटी प्रभुओं की पग धूर झार के

दिल्ली से लौटे हैं कल टिकट मार के

खिले हैं दांत दाने ज्यों अनार के

आए दिन बहार के।’

राजनीतिक गलियारों में नेताओं के जो कारनामों कर रहे हैं उससे देश की अस्मिता पर संकट के बादल मंडरा रहे हैं। इसी संदर्भ में नागार्जुन कहते हैं-

‘कुर्सी कुर्सी गद्दी गद्दी खेल रहे हैं
घटकतंत्र का भ्रूणपात ही खेल रहे हैं
जोड़-तोड़ के सौ-सौ पापड बेल रहे हैं
भारत माता को खादी में ढेर रहे हैं।’

नागार्जुन ने सिर्फ राजनीति को ही नहीं बल्कि उस नौकरशाही वर्ग को भी आड़े हाथों लिया है। अपनी ऑफिस में तो अंबेडकर, गांधी, भगत सिंह की फोटो टाँगते हैं लेकिन उनके विचारों के विरुद्ध चलते हैं। ऐसे भ्रष्ट अफसरशाहों पर व्यंग्य करते हुए लिखते हैं-

‘दो हजार मन गेहूं आया दस गांवों के नाम
राधे चक्कर लगा काट ने सुबह से हो गई शाम
सौदा पटा बड़ी मुश्किल से पिघले नेता राम
पूजा पा कर साध गए चुप्पी हाकिम हुक्काम
भारत सेवक जी को था अपनी सेवा से काम
खुला चोर बाजार, बढ़ा चोकर चूनी का दाम
भीतर झरा गयी ठठरी, बाहर झुलसी चाम
भूखी जनता की खातिर आजादी हुई हराम।’

III. निष्कर्ष :

कहा जा सकता है कि यथार्थवादी जन कवि बाबा नागार्जुन अपनी कविताओं में समय और समाज की सच्चाई को बड़ी बेबाकी से कहने में संकोच नहीं करते बल्कि सीधे-सीधे कहते हैं। मध्यकालीन काव्य में कबीर में जिस तरह से बेबाकी थी, ठीक उसी तरह आधुनिक समय में नागार्जुन में थी। इसीलिए आलोचक नामवर सिंह ने नागार्जुन को आधुनिक कबीर कहा है। कई मायनों में नागार्जुन की कविताएं आज भी समय, समाज और परिस्थितियों से मुठभेड़ करती हैं।

Work Stress and its Management among Bank Employees

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I. Abstract:

Stress is a burning issue in modern society. Each and everybody suffer from stress. Stress is the strain from the conflict between our external environment and us, which leads to emotional and physical pressure. Banking, like other services, has become one of the highly competitive sectors in India. Workplace stress has emerged as the black plague in this present scenario. The banking industry today is amongst the ten most stressful industries as per ASSOCHAM (Association of Chambers of Commerce of India). Despite feeling relaxed with the advent of modern technology and innovations in the banking sector, employees are feeling overloaded with work and stressed out. With the advancement in technology, banks have to make rapid changes. It has become hard for employees to cope with these changes. And the result is stress. This paper aims to know about the causes, effects of stress, ways to manage stress amongst bank employees.

Keywords: Banking Sector, Stress, Stress Management Practices, Work Stress

II. Introduction:

Stress is considered to be universal and it may find among all people of society in almost all walks of life. No one is immune to stress. Right from the time of birth to death an individual is invariably exposed to various stressful situations. Hence stress is a subject that is hard to avoid and due to stress Individuals are experiencing various psychosomatic and psychological disorders, feelings of frustration, dissatisfaction with life etc. Like it or not, we spend most of our waking hours in the office, so creating a positive workplace matters-and it's up to everyone on the floor to make it happen. However, stress is increasing at a rising rate in the Banking sector. Due to the recession in the global market and cut-throat competition, banks are facing many challenges. As a response of which, they have to make efforts to increase their efficiency. Banks, these days, are restructuring themselves. This results in more workload on their employees. Organizational stress ultimately results in employee turnover and changes in employees'

behavior and attitude. A little organizational stress is healthy as it increases efficiency. But stress beyond limits destroys the inner peace of the employees and ultimately hampers the growth of the individual as well as the organization. This paper on stress management strategies in the banking sector gives a detailed idea of what is stress and also the definition of stress. The main focus of the research would be on the concept of stress management; analysis of the working environment in banks; checking of the degree of stress undergone by the employees; study of the stress management strategies adopted by the banks and suggest the appropriate measures for improving the stress management and overall efficiency and satisfaction of the employees at work.

1. Stressors:

Competition, restructuring and expansion are an inevitable part of every growing industry. The banking sector is no exception. Numerous factors cause stress among employees like role conflict, uncertainty, insecurity, fears concerning job loss, job changes, compensation, role ambiguity, changes in power, status, prestige, workload, long working hours, the technological problem at work, inadequate salary, time for family job worries at home group differences and communication. Studies have found that there exists a significant relationship between all these factors and job stress. All these factors can be categorized under four heads which are:

Organizational Stressors- Inadequate salary, strict rules and regulations, Ineffective communication, Peer pressure, Role conflicts/role ambiguity, centralized organization structure, Less promotional opportunities, Lack of employees participation in decision-making, authoritative leadership, changes in power, status, prestige, workload, long working hours, the technological problem at work.

Individual Stressors - Expectations that the family members, colleagues, superiors and subordinates have from the employee create pressure amongst individuals. Failure to fulfill these expectations causes employee stress. Other individual factors causing stress among employees are inherent personality traits such as being impatient, aggressive, rigid, home group differences, lack of rewards, praise, no autonomy in the task etc. Similarly, family issues, financial problems, and changes in job profile all lead to stress

Job Stressors - Monotonous nature of the job, insecure environment, unhealthy working conditions, Lack of confidentiality, Crowding

Extra-organizational Stressors - Changes in Government policy, economic policy, and regulations by RBI. Social changes and obsolete technology are the extra-organizational factors causing stress.

2. Effect of Stress:

Excessive stress proves to be harmful to an individual. It ultimately leads to compromised health and loss of productivity. Absenteeism, shirking work responsibilities, arriving late, leaving early, etc., loss of productivity, increase in employee turnover, more error-prone work, memory loss, etc., cribbing, various psychological and psychometric problems, over-reacting, arguing, getting irritated, frustration, suicides, deteriorating health, more of accidents, etc., eating disorders, excessive smoking and drinking, insomnias, depression, improper work, delay in completion of job etc. are the outcomes of stress. Stress experienced by one employee can affect the security of other employees also. Productivity is directly related to the health of an employee. Healthy employees, higher productivity and vice-versa. Workplace stress has a significant impact on team performance, employees well being and the overall performance of an organization.

3. Stress Management Programmes:

Banks are amongst the top ten stressed workplaces in India. To increase the productivity and efficiency of the banks, banks have come forward with several solutions. Banks are employing Human Resource practitioners to solve these issues. Human Resource Department has become an integral part of the Bank. Human Resource Practitioners are involved in planning decisions. Banks are implementing various strategies at all levels so that workplace stress can be eliminated.

1. Employee's health is being given priority over other things.
2. Effective communication strategy is a tool through which the effect of most of the stressors like uncertainty, insecurity and fear of job loss can be eliminated.
3. Employees are reassessed after the accomplishment of every task.
4. It has been proposed that Employee Development Programmes should be conducted from the initial stage so that employees can easily understand the working environment.
5. Stress Control Workshops are being conducted by Banks according to the level of employees.
6. Stress in the banking sector is mostly due to excess work pressure and work-life imbalance. Stress brought by work, family life or substance abuse affects the employee's workplace productivity.

Management should take several initiatives in helping their employees to overcome work-family conflict. Banks should support and encourage taking up roles that help employees to balance work and family life. Employees also need to take steps at their level. Individuals should take steps to improve their interpersonal relationships. Meditation and yoga is also a solution to this. Employee Assistance

Programmes (EAP) should also be introduced to solve the problem. Employees are assisted. Expertise is employed for providing counseling services to various employees. Face-to-face counseling and telephone counseling is a tools of EAPs. Thus, professional help and Stress Management Programmes if implemented carefully can help in minimizing workplace stress and overcoming all the obstacles in the growth of the banking industry. If the psychological well-being and health of the employees are enhanced, the banking industry would make more revenue as well as improve employee retention in the coming future.

4. Suggestions and recommendations:

1. Job roles need to be identified to eliminate role ambiguity.
2. Employee grievances must be handled carefully so that they can mingle in the working culture of the organization. It is important from the point of view of organizational objectives as we all know that only a satisfied employee is capable of satisfying the customer and customer satisfaction is the priority of any organization.
3. Psychiatrists should be employed so that stress audits can be conducted at all levels in the organization and stress-prone areas can be identified. Thus, improving the conditions of the job and alleviating job stress.
4. Organizations should manage people at work differently, treating them with respect and valuing their contribution Thus, effective stress management and professional help can improve the performance of employees.
5. Training specifically related to the type of work in which an individual is involved and policy implementation is a key priority at this stage when banking activities have become complex. If an employee is well informed about his/her work, the less will be the stress and the more efficient the employee will become.
6. Stress Management Programs focusing on different leave categories of Employees at all hierarchical levels should be introduced so that employees can get time off from their busy schedules.
7. Jobs that are hampering employees' abilities and capacities should either be eliminated or redesigned according to the employee's potential.
8. Job-oriented training programs should be introduced which improve employee's skill and their confidence to work effectively.
9. 'Pranayam' and other meditation tools should be used as a holistic managerial strategy to deal with workplace stress.

III. Conclusion:

The efficiency of the workforce is the most decisive factor in the growth of any industry. The efficiency of a workforce is interdependent with the health and inner peace of an employee. Giving more importance to work and less importance to health and family is the main cause behind this workplace stress. Stress, in the present scenario, has become a deep-rooted evil that needs to be uprooted. Stress itself is a problem that in turn gives birth to several problems. There is a dire need for stress management programmes to relieve stress and reduce its harmful effects. This article is an effort to study the need for Stress Management Programmes due to the increasing dangers of stress under which it becomes difficult for an employee to work. Through various studies, it has been found that those firms which have adopted stress management strategies have gained a competitive edge over other firms as their employees work more efficiently. These days Stress Management Programmes have proven to be an integral part of any industry. This research article would be beneficial for the organizations to understand the share they need to spend on stress management programmes so that they can maximize their profit which would also help in generating satisfaction amongst employees and creating an environment that is stress-free.

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Internet Marketing & Challenges

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I. Abstract:

Internet marketing is an interesting topic, especially for researchers in the marketing field. It is a new way of marketing a product/service globally to the targeted market around the world. This paper introduces a new approach concerning Internet marketing in electronic commerce, showing how advertisers need this innovation to be successful. This also relieves marketing managers of more value-added tasks such as marketing plans for better development of the company.

Keywords - Internet marketing, innovation, E-commerce

II. Introduction:

In the early years of the Internet Age, the potential of using the Internet as a distribution channel excited business managers who believed this tool would boost sales and increase organizational performance. These believers suspected an online presence could offer advantages to their customers while providing a shopping experience similar to the traditional brick-and-mortar store. The advantages included providing around-the-clock access for customers, reducing geographic boundaries to provide access to new markets, and enabling immediate communication with customers. This article will focus on Internet marketing and the strategies used to make the efforts successful. The Internet poses both opportunities and threats to the field of marketing. When developing a strategic marketing plan, organizations will need to determine if and when Internet marketing will be utilized. The success of the Internet as a medium for marketing depends upon how well the system outperforms alternative systems. This article will also explore how an organization can establish a customer base with the site-centric and symbiotic marketing approaches.

Marketing: Internet Marketing Strategies Overview:

The use of the Internet is exploding, especially in the United States. People spend a lot of time on the Internet because there is a wealth of information to be found. In addition, many consumers feel comfortable purchasing online and value the Internet's capacity for providing information about different

products and services. As a result, Internet marketing has blossomed and become a key part of many companies advertising efforts. The Internet has reduced costs associated with starting and running a small business (Boaze, 2004), which is affordable. Companies have also found the Internet to be an effective communication tool for customers, potential consumers, and other businesses, and the advent of social media further enabled companies to connect and interact directly with consumers. As a result, marketing has experienced significant changes in how it operates. The Internet poses both opportunities and threats to the field of traditional marketing (Lemoine, 1999). When creating a marketing plan, organizations must determine (1) if the tool is useful for marketing their products, (2) which products can benefit from Internet marketing, (3) when it is best to use traditional marketing, Internet marketing, or a combination of both, and (4) what pitfalls need to be avoided so organizations do not experience failure when using Internet marketing. Internet marketing research has provided years' worth of valuable findings (Hou & Rego, 2002). The Internet has forever changed the way that organizations, governments, and Individuals conduct business. Therefore, companies have responded by changing the way that they market their products. Developing a successful Internet marketing strategy is necessary if an organization wants to make an impression online. A successful strategy should include a great product, a website designed to sell, and an outstanding marketing strategy (Lowery, n.d.). All three of these areas are important and must be developed. If one area fails, chances of success may be reduced. Lowery suggests a three-step process for ensuring the success of an Internet marketing strategy.

Step 1: Develop Product-A company should create a unique product that gives potential customers what they want. The product should fill a void in order to overcome the threat of competition. The company must also develop a target market. Researching the market is key. The company will need to find out what people want in order to develop a unique, quality product presentation.

Step 2: Develop Website- The website should be designed to sell the product(s). The purpose of the website is to convince the consumer to buy the product. Therefore, words become important. Although graphics are impressive, words mean more. Consumers seek Information and..

E-commerce optimal solution for Internet marketing:

In order to understand how to buy e-commerce solutions we have to take a closer look at the e-marketing business models. Kenneth C. Laudon and Carol Guercio Traver explain in E-commerce 3rd edition some aspects regarding e-marketing business models and define two main categories to dig into. B2C, business-to-consumer markets and B2B, business-to-business markets. However, B2C and B2B are classified into: B2C B2B 1. Portal 2, E-tailor 3. Market Creator 4. Transaction Broker 5. Content provider 6. Service provider 7. Community provider 1. E-distributer 2. E-procurement 3. Exchange 4. Industry Consortium 5. Single firm 6. Industry-wide Taking into consideration that some organizations use mixed policies to

build their own strategy which matches their goals. Of course, there are other models such as C2C, consumer-to-consumer market, peer-to-peer market, etc. but those shall never serve our main target which is industrial products and their exposure by the e-marketing revolution. While an industry structural analysis helps us understand the impact of e-commerce technology on the overall business environment in an industry, a more detailed industry value chain analysis can help identify more precisely just how e-commerce may change business operations at the industry level. One of the basic tools for understanding the impact of information technology on industry and firm operations is the value chain the concept is quite simple. A value chain is the set of activities performed in an industry or in a firm that transforms raw inputs into final products and services. Each of these activities adds economic value to the final product; hence, the term value chain is an interconnected set of value-adding activities. The figure illustrates the six generic players in an industry value chain: suppliers, manufacturers, transporters, distributors, retailers, and customers. By reducing the cost of information, the Internet offers each of the key players in the industry value chain new opportunities to maximize their positions by 12 Lowering costs and /or raising prices. For instance, manufacturers can reduce the costs they pay for goods by developing web-based B2B exchanges with their suppliers. Manufacturers can develop direct relationships with their customers through their own websites, bypassing the costs of distributors and retailers. Distributors can develop highly efficient inventory management systems to reduce their costs, and retailers can develop highly efficient customer relationship management systems to strengthen their service to customers. Customers in turn can use the web to search for the best quality, fastest delivery, and lowest prices, thereby lowering their transaction costs and reducing the prices they pay for final goods. Finally, the operational efficiency of the entire industry can increase, lowering prices and adding value to consumers, and helping the industry to compete with alternative industries. Dell Inc., for instance, employs a number of these stratagems, most notably a sales model for personal computers that bypasses traditional retail distribution channels by selling directly to consumers over the web. Dell also has developed a highly efficient supply chain management system to reduce its costs, and an equally efficient customer relationship management system to support customers and add to the value of its products. And that shall lead us to the e-commerce web models that organizations can use to implement the most appropriate web solution to meet their needs and their client's needs in the same way. Models should promise a high functionality to meet all clients' requests meeting a lower cost average to the organization itself. The simplest structure for a web solution should be implemented as in this diagram. What 13 features this web solution on other solutions is the purchasing and shipping processes. These features can only be seen whenever there is a tangible product to be delivered. However in industrial products sometimes there are services beyond the purchases and shipping processes like after-sales services. And this leads us to a very important issue which is what exactly should be implemented for an

industrial product to meet the optimal e-marketing criteria. In order to create a strong understanding we are going to take into consideration the U.S. government standards for metal fabrication (steel tanks) that we are going to focus on in studying the industrial products market. The main objective of a web solution is to deliver content to customers and to complete transactions. The faster and more reliably these two objectives are met, the more effective and efficient the web solution is from a commerce perspective. The optimization of the web solution performance is more complicated than it seems and involves at least three factors: page content, page generation and page delivery. Using efficient styles and techniques for page design and content can reduce response times by 2-5 seconds. Simple steps include reducing unnecessary HTML comments and white space. Using more efficient graphics and avoiding unnecessary links to other pages on the site. Page generation speed can be enhanced by segregating computer servers to perform dedicated functions (such as static page generation, application logic, media servers, and database servers), and using various devices from vendors to speed up these servers. Using a single server or multiple servers to perform multiple tasks reduces throughput by over 50%. Page delivery can be speeded up by using edge caching services such as Akamai, specialized content delivery networks such as Real Networks, or by increasing local bandwidth. Finally before stepping forward in optimal patterns for industrial products three major functions should exist to complete the business model: online catalogue, shopping cart, and credit card processing. A short-word online catalogue is a list of all available products on the web solution. A shopping cart allows shoppers to set aside desired purchases in preparation for checkout, review what they have selected, edit their selections as necessary, and then actually make the purchase by clicking a button. While credit card processing is the conjunction with credit card software which verifies the shopper's credit card and then puts through the debit to the card and the credit to the company's account at checkout.

The Internet and the Marketing Mix:

Nowadays, the concept of Internet marketing has expanded and brought more opportunities for companies to approach their customers. In the past, the Internet was only used as a tool to contact customers, part of direct marketing. Nowadays, the Internet, particularly websites has been becoming a popular media for firms to introduce their products and services. The Internet is considered an independent and effective marketing tool. During eight years, from 2000 to 2008, the number of Internet users has increased by 4 times from about 361 million to more than 1, 46 billion (<http://www.internetworldstats.com/stats.htm>), in which, Asia, the continent with the biggest population accounts for 39.5% of World Internet Users. Figure 3: World Internet users by World regions Source: www.internetworldstats.com/stats.htm 10 In Finland, nearly four out of five Finns aged 15 to 74, or over three million persons, used the Internet in Spring 2007 (www.stat.fi). To understand precisely how the Internet offers new opportunities to the traditional

marketing model, it is necessary to examine it based on the marketing mix which is traditional but still applicable. In 1960, Jerome McCarthy introduced the marketing mix widely referred to as the 4 Ps of Product, Price, Place and Promotion. Until now, it still plays an important role in formulating and implementing marketing strategies. The 4 Ps have been developed and extended to the 7 Ps with the appearance of People, Processes and Physical evidence (Booms and Bitner, 1981). It provides an effective strategic framework for changing different elements of a company's product offering to influence the demand for products within the target market (Chaffey et al. 2006, 215). However, the researchers only focus on the first main and traditional 4 Ps in this paper due to some limitations. According to Philip Kotler (2003), a Product is a solution to a customer's wants or/and needs. It refers to the characteristics of a product, service or brand. The Internet offers options for varying the core product, options for changing the extended products, conducting research online, the velocity of new product development and the velocity of new product diffusion (Chaffey et al. 2006, 217-222). Many digital products now can be purchased easily over the Internet via providers' websites. For other products, instead of providing actual products to customers, many companies publish detailed product information with pictures or images. Thanks to this, consumers still have Parents since the process of testing new products is more rapidly effective. The information about new products will spread out more wildly and quickly. P is the most flexible element compared to the other three elements of the marketing mix and can be changed quickly to adapt to the market's demand. Companies can use the Internet to build differential prices for different customers in different countries, based on IP (Inter Protocol) analytic technologies. Buyers are able to find out the price differences by visiting companies' websites or price comparison sites. In addition to this, the Internet reduces costs and price per product by reducing operating costs of stores and a number of stores. Therefore, the Internet is considered the most effective marketing tool (DPS Verma et al. 2003, 135-156). Together with these advances, many new payment methods are created. The online payment method using credit cards is the most popular, efficient, convenient and a flexible way for companies and customers. Bills can be paid at anytime and anywhere. Moreover, companies can cut costs by reducing paper works since the customers fill in all necessary information such as their own private information and credit card information. Besides these conveniences, online customers still have to worry about security and privacy matters. Hence, some third parties provide services to protect consumer privacy and secure transactions. PayPal is one of the most successful companies in this business sector. Place in the marketing mix refers to how the product is distributed to customers. A new method of distributing goods through online selling is offered by the improvement of the Internet. It is possible for customers to make their purchasing decisions anywhere at any time. The Internet has the greatest implications for the Place in the marketing mix because it has a large marketplace (Allen and Fjermestad 2001, 14-23). Companies now can expand their business from local areas to the whole country even to the international market. They also can use

the Internet to exploit new markets with low-cost international advertising since they do not have to establish sales infrastructure in different countries (Chaffey, 2006, 237-243). The Promotion element of the marketing mix refers to how marketing communications are used to inform customers and other stakeholders about an organization and its products (Chaffey 2006, 243). The Internet can be used to review new ways of applying each of the elements of the communications mix such as advertising, sales promotions, PR and direct marketing; assess how the Internet can be used at different stages of the buying process; and assist in different stages of customer relationship management from customer acquisition to retention (Chaffey 2006, 243-245). Internet Advertising: It is a form of advertising that uses the Internet to attract customers by delivering messages through websites or advertising banners on other popular websites which leads online users to a company site. The company website must be well-organized, well-designed and user-friendly in order to attract more target customers (Rowley, 2001) Sales promotion: Thanks to the Internet, sales promotions such as competitions or price reductions can be provided to visitors of the company website in a cost-reduced way. This not only encourages the customers to visit the company website again but also provides the means for the company to build a long-term relationship with their customers (Chaffey, 2006, 243-245). Public relations: The Internet is a new medium for Public Relations (PR), Blogs, Podcasts / Internet radio shows, online newsrooms and media kits offer companies a new opportunity to publish the news directly while in traditional marketing they would wait for periodical publications (Chaffey, 2006, 243-245). 13 Direct marketing: Thanks to the Internet, companies nowadays have a new tool for direct marketing and advertising that may be cost-effective and maximum delivery to targeted customers. By using e-mail to collect customer feedback quickly addresses, the company can establish a two-way communication method with customers (Chaffey, 2006, 243-245)

III. Challenges:

1. A bad reputation.

A lot of money spent on Internet marketing over the past few years was wasted. Why? One big reason is that the stock market distorted company valuations and rewarded (or failed to penalize) profligate attempts to drive traffic or acquire customers even if only temporarily. Now e-marketing has a bad reputation. And half-baked metrics such as click-through rates (CTRS) still paint a picture of inefficacy and failure. Plenty of evidence shows that the Web is the most cost-effective branding medium available, but the Net's reputation will need to be rebuilt one Success at a time.

2. Marketing integration.

Most major marketing efforts utilize multiple channels, on- and offline. Email, Web viral Internet marketing should serve concrete, measurable objectives as part of an Integrated Advertising, and Campaign. But coordinating e-marketing with other marketing efforts is an underdeveloped art. Some

Companies have successfully linked the Net to under-the-cap promotions or to teaser campaigns for new Product launches. But all too often the Internet is tacked on at the end of a marketing plan. Determining the Strengths (and weaknesses) of the Net relative to other channels is a project we all should be Working on.

3. E-CRM.

Imagine recognizing the needs of customers as they enter your site. Over time, through Implicit and Explicit data, you learn about the preferences of each and can serve customers based on their Habits, needs, and Wallets and purchase drivers. You build deep loyalty, and you increase your share of your customers'.

4. Privacy.

Things have quieted down somewhat since Double Click backed away from its plans to merge its Online data with offline Abacus data. But the industry's privacy issues have not been sufficiently resolved. Most consumers don't completely trust Web companies and shy away from offering information about them. Companies that collect data responsibly are exposed to misguided scammers invite. Sound policy, adopted industry-wide, is imperative regulation that spammers and,

5. Traditional advertising dollars,

The discrepancy between the amount of time people spend online and the amount top advertisers spend there is enormous. According to a recent Morgan Stanley Dean Witter report, the top six advertisers than one per cent of their advertising dollars on the Web. With dot-com ad spending in decline, attracting traditional advertisers (mainly by addressing the four issues above) is the key to the industry's Growth.

6. E-mail Address Churning

As the giants of the Internet continue to scrap it out, several new e-mail projects have been launched to help build and maintain online loyalty. Facebook announced its vision for the future of messaging for its 500 million users. Not to allow for new and more personalized domains and addresses. It will tempt you to get rid of that clunky stevstrhay99 user name many of us have been saddled with outdone, AOL has announced that it will be very for years to see a lot of customers on the move and changing their primary e-mail next few months, potentially cutting us off. Initiatives and incentives to keep e-mail addresses up to date will be critical. The trick is to keep the issue top of mind with customers and make We might expect addresses over the and profiles it easy for them to update their profiles.

7. New Layer of E-mail Filtering

Gmail's Priority Inbox and Facebook's Social Inbox may result in mail ending up in folders reviewed. This potentially has a knock-on effect on our opening rates and other performance metrics that are rarely ironically, it is those same metrics that will help us here. We will need to work harder to ensure that our customer is opening, clicking, sharing, and forwarding our e-mails; this helps with complex relevancy

scoring that will ensure the message finds its way to a higher-priority destination. It spells the end of one-way communication and opens up some exciting opportunities for on-message interaction with customers.

8. Increased Integration with Social Networks

Love them or hate them, many of our customers are almost permanently active on social must be equipped for instant integration; sharing, liking, posting, and linking. This is a huge benefit for getting exposure and endorsements from trusted friends. We must ensure we are making it easy, from a design and technology point of view, to facilitate this. With all the extra exposure we will get, we must make it easy to engage all these new contacts we will meet as a result.

9. Trigger-Based E-mail

"Right message, right person, right time" has been a maxim of direct marketing for years. The industry challenge is that the "right time" now might be a window of perhaps two minutes. In time, the role of trigger-based e-mail that can engage and interact after a specific action, perhaps reviewing a promotional Web page, will be increasingly critical. There are performance and revenue benefits here, but managing privacy concerns will be critical. Customers don't want to feel that we are stalking and spying on them. Once we have checked off the customer's preferences, we want to surprise and delight them with our ability to their needs anticipate

10. Mobile

These columns are full of stories on the explosive growth of mobile devices which e increasingly being served up. Feedback from one client recently suggested that 49 per cent of customers would prefer to read news and offers on a mobile phone. This one cannot wait. Are your detectors and render based on the operating system they arrive at? Are you writing your copy and treating e-mails are messages able to images for readability and performance over a mobile? It could just make or break a campaign. All that remains is to wish you a happy and successful New Year. Here's hoping that your mobile, Smartphone, or tablet is in your New Year's resolutions and that your campaigns perform for you and delight your customers.



IV. Conclusion:

The Internet network is a marketing channel used by advertisers, marketers, and society to find the right combination of the marketing mix to best suit customers' needs. It is important for a company of this era to have access to the Internet to be more successful. Internet marketing does not only target consumers but also Internet advertisements and client marketers from companies. This is so because companies prefer to hire a specialist in creating a Web site. People always find themselves under the stress of working long hours and they do not have enough time for social activities or even shopping. It is filled with many complicated challenges that can put you off track, confuse you, and prevent you from succeeding. Reports and eBooks that attempt to give you a one-size-fits-all approach tend to miss a very important point; successful internet marketing requires you to be dynamic, and intelligent, and a set of static, unchangeable plans is unlikely to make you successful. That is exactly why this was drafted. Instead of giving you a paint-by-numbers approach, I've given you a set of rules that you with a firm, workable framework within which you can build a successful business. These rules will leave you with the flexibility to remain responsive and to come up with dynamic problems. And with that, I leave you to build your online marketing business.

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Human Resource Audit: Optimization of Effectiveness and Efficiency of Human

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I. Abstract:

The management has to recognize the important role of the Human Resource Department to successfully steer organizations towards profitability. The management must invest considerable time and amount, to learn the changing scenario of the HR department in the 21st century. To survive the competition and be in the race, HR Department should consciously update itself with the transformation in HR and be aware of the HR issues cropping up. Since all the activities in an organization are accomplished by the people, for the people and with the people, the aspect of human resource management gains significance. Successful human resource management practices must meet company-specific Requirements and targets. Also, they should be efficient, economical and lean. Against this background, different aspects of the human resource audit framework have been discussed in this paper.

Backdrop:

An important function of the managerial job is to maintain control over the operations. This equally applies to the human resource management function. Persons in charge of manpower management must keep a record of what is happening to the personnel so that evaluation can be made periodically of how effectively the human resources of the organization have been utilized. Human Resource Audit can be made of the effectiveness of past forecasting and scheduling to ascertain how far the needs were identified in time. If such an audit indicates that the forecasting was inaccurate, management can start thinking about how to improve the forecasting techniques and variables has to be avoided. Human resource management function is increasing in importance and securing a more sophisticated and scientific outlook. Human resources being the most valuable asset of an organization, productivity and ultimate profitability of the entire organization depend considerably on the effectiveness with which the human resource management function is executed. Human resource management is a dynamic function that aims

at optimizing the effectiveness of the human resources of the organization. In doing so it lays as much emphasis on Individual and group goals as on organizational goals and seeks to weld them together by integrating the individual with the organization. Objectives of human resource management are effective utilization of human resources, maintenance of an adequate organizational structure and relationships, integration of the individual and informal groups with the organization, a satisfaction of individual needs and group goals, maximum individual development, maintenance of high morale and appreciation of human assets.

II. Human Resource-An Asset Appreciating In Use:

Organizations are social systems, composed of roles, interactions and relationships among people occupying various positions in their structure. The success of an organization in accomplishing its goals significantly depends on the nature and patterns of cooperation being individuals, and formal and informal groups. As such, people, as individuals as well as group members, constitute the pillars of organized effort. It is they who provide an organization with an enduring competitive edge over its competitors and determine its ability to survive and grow in a dynamic environment. Technological, product or strategic superiority of an organization over its competitors provides it only a temporary gain as all these things lends themselves to adaptation by competitors. But human assets of the organization, unlike physical assets, continuously appreciate, as knowledge, abilities and skills all grow with training and experience. The ability of an enterprise to optimize its efficiency and effectiveness, therefore, significantly depends on its ability to integrate its people with the organization. Personnel function is integral to the whole organization. Since all decisions in an organization are made by human beings and are put into operation by human beings, they are affected by all these decisions in one way or the other. Thus all decisions, whether they relate to marketing, financing. Production, research and development or quality control aspect of organizational activity, have a human aspect, and therefore, a personnel aspect, Personnel function is thus all-pervasive, transcends all other managerial functions and is Ubiquitous. In this sense, every manager is unavoidably a personnel manager/human resource manager.

Bringing People and Organizations Together:

Human Resource Management has evolved considerably over the past century and experienced a major transformation in form and function primarily within the past two decades. Driven by several significant internal and external environmental forces, HRM has progressed from a large maintenance function, with little if any bottom-line impact, to what many scholars and practitioners today regard as the source of sustained competitive advantage for organizations operating in a global economy, Human Resource Management is a process of bringing people and organizations together so that the goals of each other are

met. The role of the HR manager is shifting from that of a protector and screener to the role of a planner and change agent. Personnel directors are the new corporate heroes. The name of the game today in business is personnel. Nowadays it is not possible to show a good financial or operating report unless your personnel relations are in order. "Human Resource Management" is that part of the management function which is primarily concerned with the human relationships within an organization. Its objective is essentially the maintenance of those relationships, which enable all those engaged in the undertaking to make their maximum personal contribution to the effective working of that undertaking. Therefore human resource management is concerned with managing people at work. It is concerned with employees, both as individuals as well as a group. It is essentially one of the developments of efficient, loyal hard-working employees. Human resource management is concerned with helping employees to develop their potentialities and capacities to the maximum possible extent. The functional areas along with the scope of human resources management and development indicated below may be identified as the component of the personnel function.

- Organization review and analysis,
- Manpower planning, recruitment and selection,
- Manpower training and development, Performance appraisal,
- Employee remuneration,
- Employee services, Administration and records,
- Industrial relations and
- Auditing and research in manpower management.

The Concept of HR Audit:

Although there are no legal requirements necessitating a human resource audit, enlightened management has voluntarily accepted its usefulness. They use it as a tool for managerial control of the personnel programmes and practices. There is an increasing trend of evaluating this function. The Industrial Relations atmosphere in an organization can materially affect the productivity of the whole organization. In the earlier days, there was opposition to this industrial relations audit but in recent years it is increasingly being accepted as a device for improving the industrial relations situation. There is a gradual change in managerial philosophy even towards accepting employee participation to a certain extent. Besides, the social climate is changing. There is increasing intervention from the government to control manpower management by industries to protect the employees' interests and provide them with better working conditions, wages, etc. Another group that has made its influence felt on manpower management policies is made up of the trade unions whose role trend towards a human resource audit or a periodical review of the effectiveness of and strength are ever-increasing. Some factors have encouraged As an

organization grows, the need for such an audit increases. Continuous feedback is the management of human resources. Necessary to improve, for example, organizational structures dictated by growth. Thus the time has come when good organizations would encourage a human resource audit in every function of human resource management. HR Audit means the systematic verification of job analysis and design, recruitment and selection, orientation and placement, training and development, performance appraisal and job evaluation, employee and executive remuneration, communication, welfare and social security, safety and health, industrial relations, trade unionism, and disputes and their resolution. HR Audit is very much useful to achieve the organizational goal and also is a vital tool that helps to assess the effectiveness of HR functions of an organization.

Coverage Areas of HR Audit:

An HR Audit can be conducted in every aspect of management of the human resources. Generally, no one can measure the attitude of human beings and also their problems are not confined to the HR department alone. So it is very much broad in nature. It covers the following HR areas:

- .Audit of all the HR function.
- Audit of managerial compliance of personnel policies, procedures and legal provisions.
- Audit of corporate strategy regarding HR planning, staffing, IRs, remuneration and other HR activities.
- Audit of the HR climate on employee motivation, morale and job satisfaction.

The audit should start with the objectives prescribed for manpower management. It should evaluate policies about wages, promotions, training and development to determine whether changes are desirable. It should also evaluate programmes evolved for implementing policies such as the selection programme, training programmes and job evaluation.

HR Audit-A Checklist:

While conducting HR Audit, the performance of the personnel function policies may broadly be reviewed by asking the following questions:-

- What is the organization of the Personal Department?
- Is the personnel department adequately staffed?
- What is the status of personnel manager in the organizational hierarchy?
- What is personnel policy? Is the organization production-oriented or people-oriented? How does the top management look at its employees?

- How is the manpower requirements assessed? Are manpower requirements defined clearly according to the degree of skills required?
- What is the requirement policy? Are qualifications for each job specified clearly? Is the requirement procedure well designed?
- What is the internal promotion policy? Are the employees given a chance to grow in the organization itself through the objective tests to their qualifications and performances?
- Are the training programmes conducted regularly? Are they effective in updating the knowledge and skills of the employees? Are the opportunities for training adequate?
- Are the training methods modern or scientific? Are they suited to the needs of the organization?
- Are proper records maintained for all workers? Is time keeping effective?
- What is the procedure for dealing with the grievances of the employees? Are they encouraged to speak to the personnel manager?
- How is the discipline maintained? How are the erring workers dealt with? Is there a uniform and stable policy of dealing with indiscipline and misconduct on the part of all the employees?
- Are the various human cost properly analysed? Is the cost of labour turnover and absenteeism worked out periodically? Are attempts made to reduce labour turnover to optimum levels?
- What effectively is labour welfare organized in the organization?
- Is there machinery for dealing with the demands of the workers? Is legitimate union activities encouraged?
- What is the extent of man-hours lost due to strike or lockout?
- How these losses compare with the man-hours lost by similar organization in the area?

The Role of HR Audit:

The main objective of the personnel function is to create such conditions in the organization that the employees can put to the best performances. The human resource manager has to assess manpower replacements, select, recruit, train and develop persons, ensure industrial peace, redress grievances of the workers, maintain discipline, keep various personal records and negotiate wage settlements. The performance of the human resource function policies may be broadly reviewed by conducting the HR Audit. Human Resource Audit provides various benefits to the organization. These are:

- Development of the professional image of the HR department of the organization.
- Reduce the HR cost.
- Motivation of the HR personnel.
- Provides timely legal requirement.

- Sound Performance Appraisal Systems and Systematic job analysis.
- Smooth adoption of the changing mindset.

The Road Ahead:

Organizations are more dependent on HRM to increase the success ratio in today's competitive global environment. The role of the HR manager is shifting from that of a protector and screener to the role of a planner and change agent. Personnel directors are the new corporate heroes. The name of the game today in business is personnel. The recent quality management standards ISO 9001 and ISO 9004 of 2000 focus more on people-centric organizations. Organizations now need to prepare themselves to address people-centered issues with commitment from the top management, with renewed thrust on HR issues. Accordingly, Suitable HR policies that would lead to the achievement of the Organization, as well as the individual's goals, should be formulated. HR managers have to manage all the challenges that they would face from recruiting employees, to training them, and then developing strategies for retaining them and building up an effective career management system for them. Just taking care of employees would not be enough; new HR initiatives should also focus on quality needs, customer orientation, productivity and stress, teamwork and leadership building. HR Audit takes care of a holistic approach to human resource management practices.

III. Concluding Remarks:

The role of Human Resource Management is becoming all the more important. The personnel function can be audited resulting in a critical review and evaluation of the manpower management programme including the employer-employee industrial relations situation. The objective of such an audit is not merely to ascertain weaknesses but also the strengths of the manpower management programme. The existence of such an audit indicates the desire of persons in charge of the personnel management function to do better and improve their performance. Above all changing social values and attitudes must be kept in mind. Efforts must be made to optimize the effectiveness and efficiency of Human Resources!

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IMPLICATIONS OF TECHNOLOGY ON INTERNET BANKING: A CUSTOMER CENTRIC STUDY

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I. Abstract:

The Internet technology and the entry of foreign banks into the arena of Indian banking enlarged the opportunity to benchmark against them in terms of quality and performance. The opening up of the Indian banking sector to private players acted as 'the tipping point for a transformation. This led the researcher to undertake a study to know the implications of Internet banking by concentrating on the customers. The introduction of Information Technology in the banking industry enabled the banks to access, process, store and dissemination information electronically. To be able to survive and grow in the changing market environment, banks opted for the latest technologies. Thus, they can offer the best solution and provide the support required for customers to achieve maximum value from the product or service. This technological revolution in the banking sector has led to a sophisticated development in payments and settlement systems. Key Words: Technology, Customer, Banking, SSBT.

II. Introduction:

Technology has made a revolution in every walk of human activity. The present Technological environment is a challenge to provide multiple and innovative contemporary services to customers. The impact of technology and the increase in global literacy levels have set the expectations of customers. Increased use of modern technology has further enhanced reach and accessibility. The key to the success of a bank lies in adopting state-of-the-art technology and continuously accelerating business processes. The adoption of technology in service industries is becoming a strong trend as service providers are now being urged by industry bodies to invent technology as a way of securing their future in the electronic age. Liberalization has brought several changes in the banking sector in India and the competitive pressures also have forced banks to reconsider the way they do business. Thus, traditional over-the-counter banking is being strongly challenged by self-service techniques. A combination of computer,

telecommunications and internet technology has paved the way to making online banking service offerings a reality by offering bank customers several ways of accessing banking services. With the use of the online banking channel, banks can offer almost all their products and services online. This provides advantages not only to the customers but also to the service providers. The rationale is to reduce their overheads and personnel costs and to gain closer access to customers by providing the services at reduced cost with greater convenience, potential time saving and faster response. Amusing the power of technology for making the banking system more efficient is a big opportunity and a bigger challenge for the banks. By keeping this in mind, banks have made a heavy investment in developing online capabilities. For the past three decades, India's banking system has had several outstanding achievements to its credit. Earlier, technology was primarily employed in banks to automate back offices. This situation has been changed by a move of IT into the front office, enabling the activities beyond branch level activities. ICT enabled the banks for a good beginning of efficient management information systems. Thus, IT applications extended from the back office and front office to other branches and even to other banks. The entry of private players and issuance of new RBI guidelines forced nationalized bank to redefine their core banking strategy.

Significance of study:

Gone are the days when customers were happy to deal with a bank that issues a credit card in addition to the ordinary business of accepting deposits and lending loans. But the growth of technology altered the traditional delivery channel of banking services to their customers. SSBT is a great enabler and provides huge opportunities for the bank to make banking more efficient and inclusive. The objective of technology adoption is to ensure faster and easier customer service and more useful information, instantly, economically and easily to all those who need it. The banking sector in India has also experienced explosive growth by transforming traditional practices in banking. Technology has changed not only the internal organizational processes but also influence the way in which financial institutions interrelate with their customers.

Review of literature:

The study has been reviewed by referring to the various journals and magazines which were reported at the national and international levels. The usage and application of Internet banking at different levels have been examined by different authors; the same has been presented in the review of the literature. Timothy H. Hannan & John M. McDowell (1984) examined the relationship between the decision to adopt new technology and its determinants by the banks which differ considerably in terms of the competitive environments in which they operate. It was found that larger banks operating in more concentrated local

banking markets register a higher conditional probability of adopting new technology, all else equal. Robert Johnston (1995) examined banking customers' perceptions of the service quality they received. It found that there are 18 service quality attributes Access, Aesthetics, Attentiveness/helpfulness, Availability, Care, Cleanliness/Tidiness, Comfort, Commitment, Communication, Competence Courtesy, Flexibility, friendliness, Functionality, and Integrity. Reliability, Responsiveness and Security. Niels Peter Mols (1998) Compares users of PC- based home banking systems with non-users. The result of the study shows that users of PC banking are more satisfied, less price sensitive, have higher intentions to repurchase and provide more positive word-of-mouth than non-users. For the banks, these results indicate that PC banking systems will become a stable source of revenue from a mass of loyal customers in future. Millind Sathye (1999) quantifies the factors affecting the adoption of Internet banking by Australian consumers. The study shows that security concerns and lack of awareness about Internet banking is the major obstacle to the adoption of Internet banking in Australia and suggests that delivery of financial services over the Internet should be a part of the overall customer service and distribution strategy.

Statement of the problem:

Banking services have undergone drastic changes and the adoption of most modern technology is intended to cater to the diverse requirements of customers more economically and effectively. The shift from traditional banking to e-banking has changed customers' expectations significantly. With the rapid growth in the services industries across the economy, customers have been exposed to higher standards of services and customer orientation. This needs to be backed by a powerful and customized loyalty program for customers to be continuously encouraged to keep using their service. All the banks started revamping their retail delivery channels. Their core focus became serving maximum customers with less cost. Thus, the technology waves are reshaping the banking landscape and the banking environment has become highly competitive today. Hence the researcher thought to undertake to study under the title "Implications of technology on Internet banking: a customer-centric study.

III. Objectives of the study:

The present study is primarily intended to unearth the customers' perceptions in using self services banking technology (SSBT) services by the bank customers. The study is conducted with the following specific objectives.

1. To understand the purposes for which SSBT services are used.
2. To study the extent of use of SSBT services.
3. To study the level of customer satisfaction on SSBT services.
4. To provide feasible suggestions for the improvement of internet technology in banking.

Scope of the study:

The present study is a customer-centric study related to self-service banking technology the study is restricted to retail bank customers, who use at least two SSBT services provided (SSBT) service which consists of ATM internet banking (IB) and mobile banking the scope of the various banks. The rationale for selecting the study is due to the existence of good banking habits, high literacy rate, and surge for e-literacy and passion for technology among people and also due to the existence of a good e-platform and large network of banks.

IV. Research methodology:

The data required for the study are collected from both primary and secondary sources. The secondary data were sourced from RBI reports books, periodicals, journals and websites. The information collected has been reviewed and presented to fulfill the study objectives set by the researcher.

Research gap:

It has been observed that none of the reviewed studies addresses the issues such as analyzing services related to E-banking, technological developments in scheduled commercial banks, different aspects affecting customer satisfaction towards Internet banks problems and forecasts of E-bank, responses of the customers on Internet banking in Vellore district region. The study tries to find the research gap and fill it with the analysis of the research

Concept of SST and SSBT:**1. Self Service Technology (SST):**

SST refers to the applications of a technology for a service in which the customer himself operate the system to avail a service. According to Bitner (2002), Self-Service Technologies (SSTs) are automated delivery systems which allow customers to produce a service independent of service employees. It is an effective source to reduce costs and to increase the number of customers for the firm. They are increasingly changing the way the customers interact with the firms to create service outcomes. Choosing, implementing and managing effective SST's is a challenging task for the firms. Success with SST is dependent upon customer-focused design.

2. Self Service Banking Technology (SSBT)

Technological applications in the banking sector are classified into two viz, SSBT (Self Service Banking Technology) and Non-SSBT. MICR, Cheque transactions, Fake note detectors etc, are considered as Non-SSBTs. The channels for delivering banking services such as ATM Internet Banking and Mobile Banking are grouped under SSBT. For availing of SSBT service customers are expected to perform some operations, for which a basic awareness of operation is required. From the customer's perspective, SSBT is the realization of their anywhere, anytime and anyway banking dream in Karnataka. For the banks, technology has not only emerged as a strategic resource for achieving higher efficiency, control operations, productivity and profitability but also means survival. Banks have been compelled to embrace technology, recognizing that it will enable them to meet the increasing customer expectation and also equip them to gain a firm stand in the highly competitive banking environment.

Findings and suggestions of the study:

The main study was to identify the factors that were influencing Internet banking adoption among customers. The researcher performed both primary and secondary methodologies to find the factors responsible for internet acceptance. The study was conducted in the form of an "elicitation" study among a small group of customers. The results of the study produced the perception of customers about Internet banking. The study conducted according to the guidelines provided for the Theory of Planned Behavior model gave real insights into the customer's minds in the context of Internet banking. The results of the elicitation study are provided. A literature review of previous studies also indicated that these factors played a significant role in Internet banking adoption in other countries as well. Therefore, it could be concluded that the objective of the study is successfully achieved and the theoretical base of Internet banking acceptance could be developed. The customers were much impressed by the innovative banking facilities and the internet technology used in the banking field has made the banks more customers centric. The customers' perceived usefulness and perceived ease of use are tested in the context of Internet banking acceptance. The results gave empirical evidence that the acceptance of Internet banking was significantly influenced. Results showed that the factors of perceived usefulness and perceived ease of use had a positive influence on Internet banking acceptance. The results gave support to the construct's attitude, subjective norms and perceived behavioral control described in the Theory of Planned Behavior. The Internet is gaining popularity as a medium for conducting customer surveys and in this study the response rate confirmed the choice of the Internet as a medium for conducting surveys. The results of this study provide banking decision-makers with an insight into the perception about Internet banking among Indian customers is the most important practical contribution of this study. Internet banking is gaining popularity in India and the finding of this study allows banks to fine-tune their Internet banking product. Based on the findings of this study the following suggestions could be arrived at:

1. Banks could increase internet banking adoption by making their customer awareness about the usefulness of the service. It is seen that from the study that the variable perceived usefulness a positive influence on internet banking use, therefore internet banking acceptance would increase when Internet Banking and Customer Acceptance become holds good.
2. Proper marketing communications which would increase consumer awareness would result in better acceptance of internet banking.
3. The variable perceived ease of use had a positive influence on internet banking use. That means customers would increase internet banking usage when they find it easier to use.
4. Banks should try to develop their internet banking site and interface easier to use.
6. Banks should try to mitigate concerns of their customers in terms of internet banking technology to increase customer acceptance.
7. Banks should also take measure the trust and privacy of its internet banking infrastructure and Procedures.

V. Conclusion:

Internet banking is the need of the hour and customers are more dependent on Internet banking. Security issues are major barriers to Internet banking and e-commerce activities among consumers with fraud highlighted as an important risk associated with payment systems. Electronic banking can provide several benefits for customers and new business opportunities for banks, but it exacerbates traditional banking risks. Even though considerable work has been done in some countries in adapting banking and supervision regulations, continuous vigilance and revisions will be essential as the scope of e-banking increases. In particular, there is still a need to establish greater harmonization and coordination at the international level. Moreover, the ease with which capital can potentially be moved between banks and across borders in an electronic environment creates a greater sensitivity to economic policy management. To understand the impact of e-banking on the conduct of economic policy, policymakers need a solid analytical foundation. Without one, the markets will provide the answer, possibly at a high economic cost.

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ADVERTISING AS A TOOL FOR ECONOMIC DEVELOPMENT

“The man who stops advertising to save money is like the man who stops the clock to save time.”

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I. Abstract:

Advertising is the most effective and important tool to communicate superior customer value to the customers. It helps increase demand for the company's products by enhancing customer-perceived value. Effective advertising is quite essential for successful marketing and successful marketing is inevitable for the growth of the company and in turn the economic growth of the country. The advertising industry not only brings economic growth but also the economic development of the country which is very much needed to enhance the quality of life of people living in the country. This paper throws light on how the Advertising and advertising industry acts as one of the important tools for economic development.

Key Words: Advertising, Advertising industry, Economic development.

II. Introduction to advertising:

Advertising is a way of communication to encourage an audience for making a purchase decision about a product or service and conveying information to viewers. It is considered a vital and essential element for the economic growth of marketers and businesses (Ryans, 1996). Advertising is usually a paid form of exposure or promotion by some sponsor that reaches through various traditional media such as television, newspaper, commercial radio advertisement, magazine mail, outdoor advertising or modern media such as blogs, websites and text messages. Advertising is any paid form of non-personal presentation of ideas, goods or services by an identified sponsor (AMA). The above line itself has keywords that denote the nature of advertising. Firstly, 'paid' means there is a cost element in advertising, the company have to pay the advertising agency for the ad's copy creation and advertising media for ad broadcast. It also distinguishes it from free publicity. Secondly, 'non-personal' means it is a somewhat impersonal effort to

present the message to the community or a group audience. In other words, producers and consumers are not in direct contact with each other. Thirdly, the 'presentation' of a message or mass communication process means advertising is the act of disseminating information at large. In a short, the sponsor can draw the attention of millions of people. Fourthly, 'idea or product' is that constituent of an advertisement about which the whole ad is effectively created and launched publically to be aware. They are tangible and intangible goods or services or any social issue whose feature is conveyed to the target audience. Lastly, 'identified sponsors' are the financier of the advertisement; they generally include manufacturers, dealers, wholesalers on behalf of the producer, and sometimes retailers. Advertising is important for both new and existing businesses, as it helps to communicate important information to customers and is one of the first steps in building strong relationships. It raises awareness for different brands that are available in the market. Therefore, creating an effective advertising plan is essential for attaining objectives and goals. Businesses use advertising to accomplish varied goals and companies place those ads in diverse media. Advertising lets consumers choose the best goods that meet their needs. This allows them to compare similar products from different brands before deciding on what to buy. Done effectively, advertising increases the sales of a particular business or company thus boosting their profits. It also allows a company to know their competitors and plan strategically on how to curb competition. Effective advertisement helps to create a stable ground for launching a new product successfully into the market. The advertisement also benefits society in general. It improves consumer awareness thus preventing cases of purchasing fake products or falling victim to scams. If successful, an ad increases an organization's market share and solves a problem for the consumer.

III. Objectives of Advertising:

Four main Objectives of advertising are:

- Trial
- Continuity
- Brand switch
- Switching back

1. **Trial:** the companies which are in their Introduction stage generally work for this objective. The trial objective is the one that involves convincing the customers to buy the new product introduced in the market. Here, the advertisers use flashy and attractive ads to make customers take a look at the products and purchase for trials.

2. **Continuity:** this objective is concerned with keeping the existing customers stuck on to the product. The advertisers here generally keep on bringing something new in the product and the advertisement so that the existing customers keep buying their products.

3. **Brand switch:** this objective is basically for those companies who want to attract the customers of the competitors. Here, the advertisers try to convince the customers to switch from the existing brand they are using to their product.

4. **Switching back:** this objective is for the companies who want their previous customers back, who have switched to their competitors. The advertisers use different ways to attract the customers back like discount sales, new advertising, and some reworking is done on the packaging, etc.

Economic Development:

Economic development is the sustained, concerted actions of policymakers and communities that promote the standard of living and economic health of a specific area. Economic development can also be referred to as the quantitative and qualitative changes in the economy. Such actions can involve multiple areas including the development of human capital, critical infrastructure, regional competitiveness, social inclusion, health, safety, literacy, and other initiatives. Economic development differs from economic growth. Whereas economic development is a policy intervention Endeavour with the aims of economic and social well-being of people, economic growth is a phenomenon of market productivity and a rise in GDP. Consequently, as economist Amartya Sen points out, "Economic growth is one aspect of the process of economic development.

Significance of Advertising:

The significance of advertising lies in the following points.

1. Crucial for a launch:

Advertising is crucial for the launch (introduction) of a brand-new product, service or idea in the market. If the advertisement of any concerned product, service or idea is done correctly at the right place, through proper media, and within a particular time constraint, can attract many new customers. It helps to capture the market and increase the sales of an advertiser. It is also essential for announcing an upcoming event. It acts as an open invitation that maximizes the chances of event attendance. However, if people are unaware of any such happening, they may not show up. As a result, the event may not get the expected response. Hence, it also contributes to the success of an event.

2. Increases sales:

Advertising sparks an interest in advertised products and services to the masses. Interest creates demand in the market. The growing demand soon results in higher sales. Eventually, the advertiser fulfils his main goal of investing in an advertisement.

3. Maximizes profit:

Advertising helps in increasing sales and controlling the cost borne by the advertiser. It helps to widen the gap between his sales and incurred cost. By maximizing sales and lowering costs, the profit of an advertiser grows. Thus, it aids in maximizing the profit of its advertiser.

4. Consumer awareness:

Advertising creates awareness by informing consumers.

a. Awareness: It creates awareness among consumers about the availability of any particular product or service in the market. It attempts to convey to them why an advertised product or service is better than other alternatives currently available in the market.

b. Information: It informs a consumer, mainly about; various feature benefits, prices and use of an advertised product or service. It also gives information about the brand name or trademark used the address of a manufacturer or a service provider, and other relevant details to the consumer.

5. Educate the society:

Advertising has a remarkable ability to reach the masses and educate society. Therefore, many Governments and even Non-Governmental Organizations (NGOs) often ace the help of advertisements to reach and educate people on important social issues. Creative ads released in the public Interest teach people about Family planning, AIDS awareness, Saving water and electricity, giving children compulsory education, providing the right kind of nutrition to the mother and her new-born infant, Abolishing child labor, etc.

6. Monitor demand and supply:

Advertising, if done repetitively, helps in generating higher demand in the market for advertised products and services. The rising demand must get fulfilled with an equivalent amount of supply of products and efficient delivery of services. Proper care must be taken to monitor the demand and supply function so that none of the demand remains unfulfilled.

7. Builds Brand's Image:

Advertising creates goodwill and helps in building a brand's image in the market, repeated advertisements make branded products and services very popular. People tend to show a more trustworthy attitude towards advertised brands over non-advertised ones. Well-known branded products are usually made from quality raw materials and hence are preferred by most consumers. As a result, the demand for branded products increases. The rise in popularity and building of trust gradually helps to increase the value of the brand name, eventually; this boosts sales of branded products and services. It also popularizes the reputation of the entity that owns these brands.

8. Generates employment

Advertising agencies are constantly in search of newer creative ideas to cope with the rising demands from their clients (advertisers). Each ad assignment (project) requires a high- level of mental labor. There are deadlines by which projects must be completed and submitted. Furthermore, the concept of an ad must be also welcomed (approved) by the advertiser. Overall, this creates a demand for creative people and thus opens new employment opportunities in the field of advertising. It employs deserving candidates who are creative thinkers, directors, cinematographers, artists, models, graphic designers, sales representatives and managers.

9. Advertising Is the Lifeblood of The Media:

Advertising funds a diverse, pluralistic media landscape. Without advertising, many of the world's media as we know them would not exist. Advertising is an integral part of the freedom of expression. It is impossible in a democracy to separate the freedom of publishing or broadcasting news, opinions or entertainment, from the freedom of advertising.

10. Advertising Funds Sports and Culture:

Advertising and sponsorship play an essential role in enabling sporting events such as the Olympic Games. Sponsorship also supports community sports teams, grassroots cultural events and aspiring artists.

11. Social Marketing For A Better Society:

All over the world, public service advertising has proven to be an effective way to increase AIDS awareness, promote energy saving, fight domestic violence, or reduce road deaths by encouraging the use of seat belts. In fact, many national governments are among the largest advertisers. Companies too are

using advertising to help address societal challenges. They are increasingly conscious that beyond selling brands and ideas, advertising can be used to show how they can help make a difference.

IV. Objectives of the Study:

1. To study the significance of advertising
2. To study the role of advertising industry in the economic growth and economic development of the country.

Research Methodology:

Secondary data is collected through sources like text books and the internet.

Linkage of Advertising and Economic Development:

Marketing has acquired an important place in the economic development of the country. It has also become a necessity for attaining the object of social welfare. Advertising is an important and effective tool of marketing without which the company finds it difficult to survive in the present era. Hence Advertising is considered the key driver in the economic growth of a c Business slump cause urns helps protect society against all these problems. Successful advertisements create, maintain and Increase the demand for goods lost to the economy. Marketing and services in society. To meet this increased demand the companies need to increase the level of production in turn raising their income. This increase, in turn, increases the national income. Further advertising leads to exports adding to the national Income. This is beneficial to the whole of society. This will lead to increased economic activities in the country, which will pull out the economy from depression. Slackness in the success of business and great.

Flow Chart Explaining

The Route To Economic Development Through Advertisements

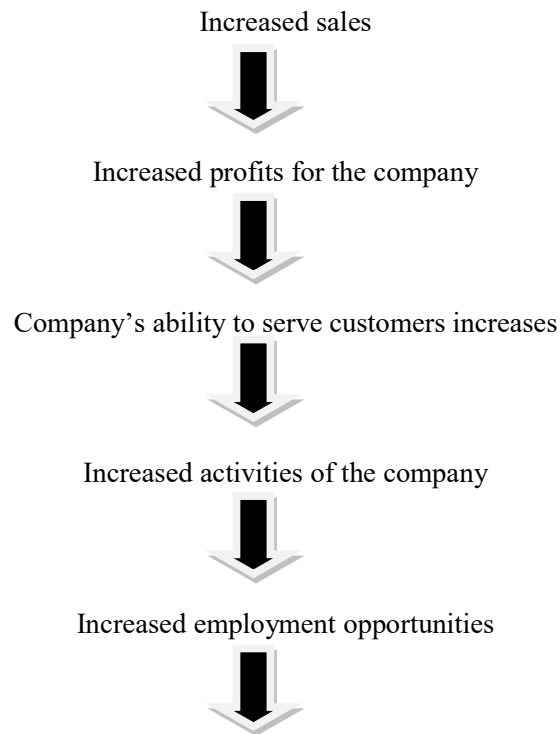


Effective advertisements



Increased demand for company products





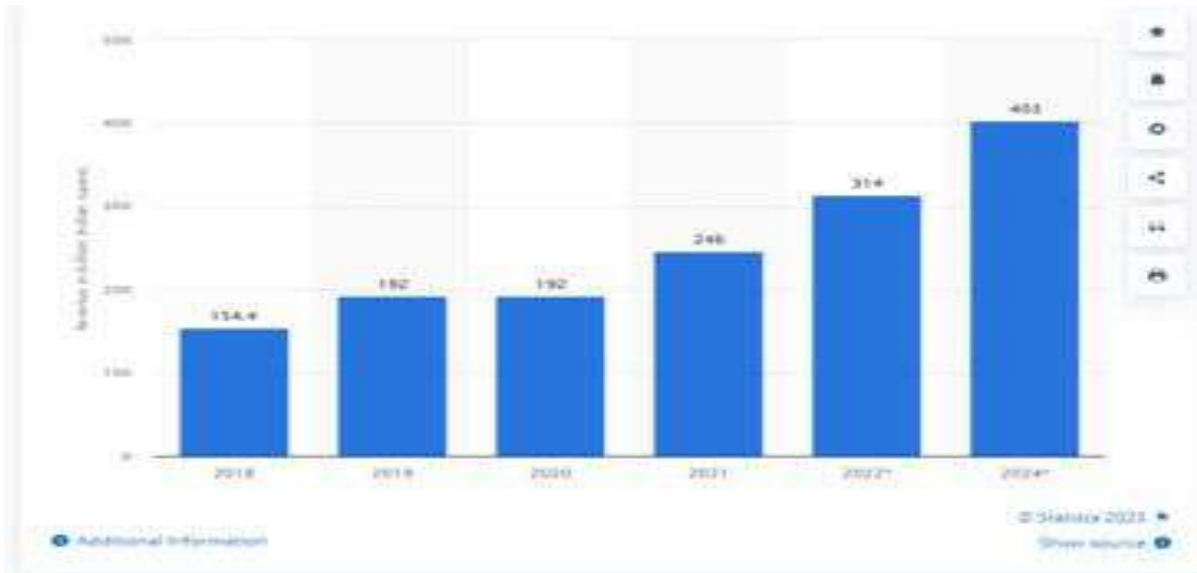
Increased Demand for other goods and services Increased economic activities in the country Economic growth of the country Economic development of the country.

Indian advertising industry:

The Indian advertising industry has evolved from being a small-scaled business to a full-fledged industry. The advertising industry is projected to be the second fastest-growing advertising market in Asia after China. It is estimated that by 2018, the share of ad spend in India's Gross Domestic Product (GDP) will be around 0.45 per cent. The Indian government has given tremendous support to the advertising and marketing industry. Advertising expenditure is likely to increase in the financial sector, driven by Reserve Bank of India (RBI) policies which could result in a more favorable business environment. Also, proposed licenses for new banks and better market sentiments render the advertising and marketing industry in India, a fertile space. India's advertising industry is expected to grow at a rate of 16.8 per cent year-on-year to Rs 51,365 cr (US\$ 7.61 billion) in 2016#, buoyed by positive industry sentiment and strong GDP growth of 7 per cent and above.

Advertising revenue in India from 2018 to 2021, with a forecast until 2024(in billion Indian rupees):

This statistic presents the advertising revenue generated in India from 2018 to 2021 and provides a projection of the revenue until 2024. It is predicted that the revenue will be 403 billion Indian Rupees in 2024.



Source: <https://www.statista.com/statistics/233493/india-digital-ad-revenue/>

Present Share in Global Advertisement:

KEY MARKETS	2020	2021	2022
WORLD	-2.6%	13.5%	6.6%
NORTH AMERICA	0.2%	14.9%	7.9%
LATIN AMERICA	-11.5%	14.8%	5.8%
WESTERN EUROPE	-5.0%	12.4%	5.9%
CENTRAL & EASTERN EUROPE	-3.4%	11.6%	5.1%
EMEA	-5.0%	12.0%	5.9%
APAC	-3.3%	12.8%	5.5%
AUSTRALIA	-5.1%	11.4%	2.9%
BRAZIL	-6.8%	15.2%	6.9%
CANADA	-5.8%	11.4%	5.7%
CHINA	2.6%	16.1%	5.9%
FRANCE	-6.0%	13.1%	7.2%
GERMANY	-3.7%	10.9%	5.0%
INDIA	-22.8%	11.0%	13.6%
ITALY	-10.4%	7.7%	4.0%
JAPAN	-6.0%	8.8%	4.9%
RUSSIA	-1.8%	11.6%	4.9%
SPAIN	-10.7%	15.2%	7.5%
UNITED KINGDOM	-2.6%	16.8%	8.0%
USA (EXCL. CE)	-1.7%	17.4%	6.5%
USA (INCL. CE)	0.5%	15.1%	8.0%

Source: MAGNA, June 2021

This data shows the present share in Global Advertisement and it represents that in the Year 2022, INDIA has the highest share i.e. 13.6%.

V. Conclusion:

Today's smartest advertising style is tomorrow's corn. Advertisements are of great importance for any business activity as it attracts people to use a particular service. In helping companies succeed, advertising plays a key role in a dynamic economy. Successful companies create more jobs, pay more taxes and contribute directly to economic growth. There is a proven link between advertising and economic growth. The advertising industry itself also contributes in a big way to economic growth, Advertising Investment is becoming an increasingly significant element in the GDP of the Industrial led world, even if emirates have not yet reached the same level of development, Along with traditional media, traditional media communication has developed considerably, the Advertising industry is not confined to only economy's growth but is also a key driver of economic development.

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USE OF COST ACCOUNTING IN COST MANAGEMENT

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I. Summary:

Cost accounting is the basic accounting tool used to optimize costs in companies. The evolution of accounting also concerned changes in cost accounting. In the second half of the twentieth century, many new cost accounting methods were created, the main task of which was to support managers in increasing the financial performance of companies. The aim of the article is to analyze the possibility of using different cost accounting methods by companies to manage their customers' costs. The main thesis is that companies are aware of the possibility of using management accounting tools to manage their customers' costs. In the article, literature studies and the results obtained from the responses to the questions in the questionnaire were used. The study was conducted among 71 companies in southeast Poland. Based on this research, it was determined that, despite the possibility of using different cost accounting methods, Polish companies prefer to use traditional cost accounting to manage their costs.

Keywords: cost accounting, finance, management accounting, cost management.

II. Introduction:

Enterprises operating under the pressure of an increasingly competitive market and growing customer demands. The consequence of operating in globalizing markets is, on the one hand, a process of increasing the difficulty of managing such enterprises and, on the other hand, easier access to the knowledge and experience of enterprises from

different regions of the world in solving increasingly complex decision-making problems. Globalization also affects the flow of intellectual capital between developed and developing countries, regions, and enterprises. These phenomena imply an increase in the level of advancement of systems enabling the effective support of decisions taken by managers. There is also growing awareness among company managers of the possibility of applying more complex methods to managing particular functions or areas of these companies. The evolution of corporate governance is to a large extent correlated with the evolution of the systems, methods, or tools supporting or enabling this evolution. Among these systems, accounting plays an important role, in which, also as a result of evolution, two main subsystems have developed: financial accounting and management accounting. The aim of the article is to analyze the possibility of using different cost accounting methods by companies to manage their customers' costs. The main thesis is that companies are aware of the possibility of using management accounting tools to manage their customers' costs. The article was written with the use of literature research, and the results of the research were obtained by responding to the questionnaire. The research was conducted among 71 enterprises in south-east Poland.

1. Cost management:

Cost accounting is a tool to measure the costs of doing business. The main objective of the project is to provide information related to the costs of separate cost objects, which are of interest to business managers. For cost accounting to work properly, financial accounting procedures are used, often integrating them with management accounting tools. One important feature of cost accounting is the continuous and systematic collection of information on costs. Properly prepared information is used to control costs, which allows for optimizing their structure and size. Cost management is aimed at reducing costs, but in practice, the possibilities of cost reduction have many limitations and therefore cost reduction in most cases will concern their optimization about the effects achieved by incurring them. The essence of cost management is to take actions that are to lead to the optimization of incurred costs. This is done by increasing the

efficiency and effectiveness of the use of resources owned by the company [Nowak (ed.) 2006, p. 15]. Modern cost management theories have their roots in, besides German or Anglo - American, Japanese economic practice and have been developed with the significant participation of Japanese researchers (see [Howell, Sakurai 1992; Monden (ed.) 2000; Okano, Suzuki 2007]). In their considerations, they pay special attention to planning the level, structure and dynamics of costs in the first stages of product life or the initial links of the value chain, which results from the fact that decisions taken at this stage largely determine the costs in subsequent processes taking place in enterprises. Reducing costs in the initial phases of the sequence of actions gives the most effective results. In analyzing the Japanese solutions, A. Jarugowa presented the definition of cost management as a process of continuous improvement, that supports the development and application of appropriate management policies and procedures. This process requires the development of a proper information system generating relevant data on significant costs. This system should inform primarily about the acquisition and use of resources so that the company can do it in the most efficient way [Jarugowa, Nowak, Szychta 1998, p. 22]. To manage costs, it is necessary to identify the factors influencing their formation. Using the Japanese experience, six stages of this process can be distinguished [Jarugowa, Nowak, Szychta 1998, pp. 22-23]:

1. Cost planning, this stage determines the costs incurred in subsequent periods,
2. Formalization of plans in the form of specific, partial budgets, which should result in allocating costs to the places and persons responsible for them,
3. Determination of external relations influencing the costs incurred; this concerns mainly the suppliers and the terms of their supplies,
4. Acquisition of resources applies not only to those shown in the assets of the company but also to those used by the company on other terms,
5. Use of resources,
6. The emergence of liability or payment for the acquired resources.

The main objectives of cost management depend on the specificity of the company, the type of business, the strategy adopted and its competitive position. The main objective

is to improve the financial results of the company by increasing the efficiency of the use of resources at the company's disposal and improving the course of activities carried out in the company. When applying cost management in practice, it is necessary to have an adequate set of information on the costs of involvement and the use of particular company resources and activities. This information should be relevant to the needs related to the achievement of specific company objectives, which are determined by the adopted strategy of the company. Business costs are identified, recorded and processed by the cost accounting system, which is a source of information for cost management. The integration of both systems must take into account the nature of the decision-making and control situation and conditions of the company concerned. To achieve this it is necessary to select and implement an appropriate cost accounting model that will measure and report on costs. The cost accounting model used should ensure that costs are allocated to the distinguished reference sites taking into account their cause-and-effect relationship with the costs incurred. This will create the conditions for shaping the costs at a rational level and enable the implementation of measures resulting in their reduction [Nowak (ed.) 2006, p. 17].

2. Cost accounting:

Cost accounting has long been recognized as the most important instrument for managing companies [Jarugowa 1986, p. 7]. It is, therefore, necessary to build a client cost accounting model that combines the most efficient (and therefore also the most common in practical applications) features of management accounting tools. There are different definitions of cost accounting in the literature. The authors dealing with the subject of cost accounting present the following:

- 1) "Generality of activities aimed at reflecting the processes of sourcing, production and sales taking place in the enterprise, by including, grouping and interpreting in the applied sections of the cost of own production and sales of the enterprise's work products, measured quantitatively and qualitatively, for a certain period, to obtain the most comprehensive information necessary to determine the results and to manage the enterprise

or its team” [Fedak 1962, pp. 8-9].

2) “All actions aimed at determining and interpreting in different sections and interpreting the value of living and objectified labor inputs expressed in money, performed in an enterprise during a specified period and with a specified purpose” [Mala... 1971, p. 652].

3) T. Peche speaks of “the grouping of own costs [...] to obtain a proper picture of their structure, in each classification section” [Mala... 1974, p. 400].

4) “Covers the measurement of costs, their current record, settlement according to the places of origin, directions of activity and types of products or services, preparation of unit cost calculations and financial reporting” [Hellwig (ed.) 1985, p. 23].

5) “Cost accounting consists in examining and transforming, according to the adopted model and standards, information on costs and revenues of past, current and intended activities to support the management of the entity” [Jaruga (ed.) 2000, p. 7].

6) “Cost accounting is defined as the measurement and delivery of financial and other information relating to the acquisition and consumption of resources and provides information for both financial and management accounting” [Hornigren et al.1999, p. 5].

7) “Cost accounting is the process of determining the costs of conducting a business activity consisting in the manufacture and sale of goods or the provision of services or the marketing of goods” [Nowak 2011, p. 13].

The quoted definitions of cost accounting are not uniform, but they contain many common features [Lew, Maruszewska, Szczypa 2019, p. 195; Szczypa 2008].

To sum up, it should be stated that for the proper functioning of cost accounting [Maruszewska 2014], including the problematic one, it is important to indicate and solve the following issues in its model [Jarugowa, Malc, Sawicki 1979, p. 40]:

- The purpose of cost accounting – to provide managers with information to assess The current situation and manage the enterprise.
- Economic processes that make up the whole value chain of an enterprise and the

related costs – treated as an expense account.

- A company – treated as a cost accounting entity.
- Recording (measurement, documentation and valuation), grouping and interpreting as a mode of action and methods of reflecting (research and quantification) the dynamic process of the course of action in the company and the increase in costs.
- the periodical presentation and interpretation of activities in terms of cost and Their sequence.
- The need to operate not only on the monetary meter but also on natural units.

Cost accounting should therefore cover all activities of the company to comprehensively support managers in their decision-making [Lew 2012]. When analyzing the evolution of accounting in general and financial and management accounting as separate accounting subsystems since the 20th century, one can conclude that cost accounting is a common part of both subsystems. The fact that the economic processes of the turn of the 19th and 20th centuries, at that time not very complicated cost accounting models, were used for decision-making purposes, leads to such a conviction. This was due to the research on the development (caused by the deficiencies of these models) of cost accounting, which so dynamically began to develop in the second half of the last century and led to the formation of management accounting as an independent entity in the consciousness of both theoreticians and practitioners involved in the management of enterprises. Figure 1 presents the scope of cost accounting, which functions within the framework of financial and management accounting.

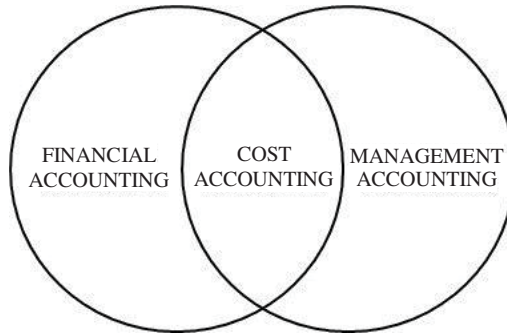


Fig. 1. The place of cost accounting in the accounting system

Source: [Nowak (ed.) 2006, p. 34; Nowak 2011, p. 12].

It follows from these considerations that contemporary accounting can be understood very broadly. It is currently aimed at actively supporting managers in shaping the present and future of the company through several analyses [e.g. Kubacka 2018] and problematic (detailed) cost accounting.

3. Application of management accounting methods in enterprises – Results of surveys:

The literature contains the results of various studies carried out by scientists in countries considered to be economically developed. This is confirmed by research aimed at identifying the most popular management accounting tools used in business practice. Similar studies were carried out in 300 US companies by K.R. Krumwiede and S.L. Charles [2006]. Their research concerned the most popular tools used in management. The synthetic results of their studies are presented in Table 1.

Table 1. The most popular methods of management accounting according to Krumwiede and Charles

Management accounting methods	Application – ranking
Measuring customer satisfaction	1
Product profitability analysis	2
Analysis of deviations	3
Budgeting	4
JIT methods	5
Customer profitability analysis	6
Benchmarking	7
Calculation of target costs	8
Costs of unused production capacity	9
Balanced scorecard	10
Value chain analysis	11
Activity-based costing	12

Source: own elaboration based on [Krumwiede, Charles 2006, p. 37].

The research of these authors also shows that problematic costing plays a dominant role. The research also shows the key importance of customers for American companies. First place among the management accounting tools is taken by the measurement of customer satisfaction, and sixth is taken by the analysis of customer profitability. In both tools, customer costs play an important role. Budgeting, although still criticized, also plays an important role [Bochenek 2018]. On the European level, similar studies were conducted in companies operating in Slovenia [Čadež 2006]. A comparison of the results obtained is presented in Table 2.

Table 2. The most popular methods of management accounting according to Čadež

Management accounting methods	Application – ranking
Capital budgeting	1
Quality costing	2
Competitor performance appraisal	3
Benchmarking	4
Strategic pricing	5
Competitive position monitoring	6
Strategic costing	7
Customer profitability analysis	8
Integrated performance measurement	9
Target costing	10
Value chain costing	11
Attribute costing	12
Brand valuation	13
Competitor cost assessment	14
Life cycle costing	15
Lifetime customer profitability analysis	16
Valuation of customers as assets	17

Source: [Čadež 2006].

The popularity of management accounting methods in Romania was presented by N. Albu and C.N. Albu (see Table 3).

Table 3. The most popular methods of management accounting according to N. Albu and C.N. Albu

Management accounting methods	Application – ranking
Financial performance measurement	1
Budgets	2
Global performance analysis	3
Full costing methods	4
Medium-term planning	5
Investment planning	6
Cost analysis as fixed/variable	7
Strategic planning	8
Standard costing	9
Environmental costs	10
Quality costs	11
Financial performance measurement	12
Planning and budgeting	13
Global performance measurement	14
Costs	15

Source: [Albu, Albu 2012].

The results of these studies relate to management accounting methods applicable in various countries around the world. However, they indicate their popularity of using them regardless of the cost. According to the research presented by A. Szychta [2002], in Poland, most enterprises use traditional cost accounting for decision-making purposes. Enterprises also use the calculation of unit production costs, liability calculation, variable cost calculation, profitability thresholds and budgeting. An interesting development of this type of research is to find an answer to the question: can the most popular cost accounting be used to manage customers’ costs? Studies taking into account the possibility of using different cost accounting to manage customers’ costs have not been conducted so far. Taking into account the most popular methods of management accounting, research was conducted into the possibility of their application to customer cost management. At the turn of 2014/2015, the author conducted empirical research that covered companies operating in southeast Poland. The basic criterion for the selection was the need for these companies to keep accounting records based on the Accounting

Act. Questionnaire forms were addressed to persons responsible for the functioning of management accounting in the surveyed companies, and if there were no such persons, the form was filled in by managing, financial or chief accounting directors. Questionnaire forms were sent out in 2014 to 208 companies. Voluntary associations of enterprises operating in south-eastern Poland: Podkarpacki Klub Biznesu (Subcarpathian Business Club) and Rzeszowska Izba Gospodarcza (Rzeszów Chamber of Commerce) helped send out questionnaires. The questionnaires were returned by e-mail, post or personal visits of the author. As many as 78 companies took part in the survey, but unfortunately, significant errors in the completed questionnaires caused the need to eliminate 7 questionnaires from the analysis. The return rate of the questionnaires is 37.5%. However, 34.13% of the questionnaires sent to companies were analyzed.

Table 4. Ranking of usefulness of cost accounts to manage customer costs

Management accounting methods	Application – ranking
Traditional cost accounting	1
Multi-level and multi-block cost accounting	2
Activity-based costing	3
Budgeting of customer costs	4
Customer life cycle costing	5
Calculation of target costs	6
Cost accounting for continuous improvement	7
Balanced scorecard	8

Source: own elaboration.

The questionnaire consisted of 21 questions, the aim of which was to verify the condition and needs of the use of cost accounting, the subject of which is the customer. One of the questions asked in the survey was about the form of cost accounting that could be used to determine customer costs. The answers were hierarchical because the respondents had to indicate the usefulness of particular cost accounts to determine the costs of customers from the list indicated in the question. The answers to this question are given in Table 4. The research shows that Polish enterprises are still dominated by traditional cost accounting, which is widely used for reporting purposes. However, it is

relatively rare for business managers to extend this cost accounting to optimize their business costs. The answers to this question suggest that if cost accounting were to focus on customers, managers would first try to use traditional cost accounting for this purpose. Second place was taken by the multi-level and multi-block cost accounting, which is probably because it is relatively often used as a cost-managed, off-book method. Other cost accounts are of less interest to the managers of the companies. This may result from a lack of knowledge of these cost accounts, the need to incur additional expenses for implementation and maintenance, or a lack of substantive justification for introducing more advanced cost accounting at the current stage of development of a given enterprise.

III. Conclusion:

The results of research obtained by most scientists on the use of management accounting tools do not include the possibility of using traditional cost accounting as a management tool. This form of cost accounting can be used by all enterprises that have accounts. In the author's research, the vast majority of the surveyed enterprises indicated the possibility and usefulness of using this cost accounting for management purposes. The lack of this cost accounting among the tools indicated in the studies of other authors may result from the fact that it is rarely considered possible to use it for management purposes. However, it has such capabilities. The main conclusions that can be drawn based on the research conducted by the author are as follows:

- Traditional cost accounting has significant managerial advantages, of course only after the appropriate adjustment of the requirements of a given enterprise and cost object, in the case of this research – the client.
- companies using traditional cost accounting are aware of the fact that it can be used for management purposes, including establishing the profitability of customers.
- In all enterprises, the client is increasingly becoming an object of interest for management accounting, as indicated by the management accounting methods dedicated to customers.

Cost accounting allows for a determination of the actual profitability of a given cost object (corresponding ending with revenues), which allows optimization of the activities conducted about this object. Knowing the actual profitability of individual cost objects (activities, customers (more in: [Lew 2006; 2015; 2017]), sales representatives, products or in other situations [Chłodnicka, Zimon 2013]), makes it possible to optimize the efficiency of operation or management of this object. The cost accounting used by a company supports the company's strategy both in operational terms and in long run. Taking into account the frequency of the indicated answers in the research conducted by the author, the thesis presented in the introduction to the study may be considered true. The next stage of this research should be the analysis of the usefulness of individual cost accounting in managing the costs of selected cost objects. In the author's opinion, the main cost object about which the research should be conducted in the nearest future is the customers. This should result from the fact that the companies' strategy has been reoriented from product to customer.

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Emerging Trends in Basic and Applied Science Research

Volume - 2

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Chapter - 1
**Jawaharlal Nehru's Views on Science and
Technology**

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Chapter - 1

Jawaharlal Nehru's Views on Science and Technology

Dr. Deelip L. Maale

Abstract

Nehru was deeply identified in the public mind with science and technology. Nehru's scientific vision was realized in the institutions for scientific research and defense strategies that he was instrumental in setting up. However, many Nehru's statements were part of his personal vision that did not find representation in state policy the application of science on large scale was the dominant features of the contemporary world.

Keywords: Identified, science, technology, research, foreign policy etc.

Introduction

Development in the fields of Science, Technology and Education during the British Rule was essentially designed to suit the ruler's defense, trade and administrative requirements, ignoring completely the large scale prevalence of hunger and poverty, insanitation and illiteracy among the Indian masses. In the wake of Indian Independence, Nehru visualized that adoption and integration of science and technology with the national planning was a must to improve the alarming socio-economic conditions of teeming millions of people. In 1945 when Gandhi insisted on the Hind Swaraj model for the future of India, Nehru said that "the question of independence and protection from foreign aggression both political and economic has also to be considered. In this context, I do not think it is possible for India to be really independent unless she is a technically advanced country, and I am not thinking for the moment in terms of just armies, but rather of scientific growth ^[1].

Science for Nehru was an essential and basic component of development and progress. He had a clear perception of progress of the developed countries and felt that attainment of superiority in science and technology alone can maintain world order. But for his ceaseless efforts, clear vision, and an uncompromising commitment, science and technology in India would not have been development major force for social and

economic transformation. In this paper an attempt is made to reflect the influence of science and technology on Nehru himself, and his endeavors to transmit the same to the fields of Industrial development, agriculture and food production, modern scientific development, formulation of science policy and atomic energy.

Nehru's scientific spirit

Nehru's attitude towards life was based on a scientific spirit, and his views were clear on scientific and technological development. He was convinced that the methods and approaches of science have revolutionized human life more than anything else in the long course of history; and have opened doors and avenues further, and even led to more radical changes, leading to the very portals of what has long been considered the unknown [2]. Nehru felt that "it is the scientific approach, an adventurous and yet critical temper of science, the search for truth and new knowledge, the refusal to accept anything without testing and trial, the capacity to change previous conclusions in the face of new evidence, the reliance on observed fact and not on preconceived theory and the hard discipline of mind. All these are necessary not *merely* for the application of science, but for life itself and solution of its many problems [3].

He stressed that "the scientific temper are, or should be a way of life, a process of thinking, a method of acting and associating without fellowmen [4]. His scientific temper and approach has come in conflict with the traditional and religious beliefs. Focusing light on some of the negative aspects of religion, Nehru pointed out that "religion as I saw it practiced and accepted even by thinking minds whether it was Hinduism or Islam or Buddhism or Christianity, did not attract me. It seemed to be closely associated with superstitious practices and dogmatic beliefs, and behind it lay a method of approach to life's problems which was an element of magic about it, an uncritical credulousness, and a reliance on the supernatural [5]. Nehru thought that religious attitude connected with austerity was bound up with the world of long' ago. Though conditions changed and raised the human level in material prosperity beyond the wildest dreams of the past, the stranglehold of the past continued, and the stress is now being laid on certain vague and immeasurable spiritual values [6].

Nehru opined that religion comes into conflict with rationalism. Religion as practiced either deals with matters rather unrelated to our normal lives and thus adopts an ivory tower attitude, or is allied to certain social usages, which do not fit in with the present age. Rationalism, on the other

hand with all its virtues, somehow appears to deal with the surface of things without uncovering the inner core. Science itself has arrived at a stage when vast new possibilities and mysteries loom ahead. Matter and energy and spirit seem to overlap ^[7].

Nehru said that in the ancient day's life was simpler and more in contact with nature. Now it has become more and more complex, more hurried without time for reflection or even for questioning. Scientific developments have produced an enormous surplus of power and energy which are often used for wrong purposes ^[8]. Nehru expressed that man is not a victim of nature, "nothing is so remarkable on the progressive conquest or understanding of the physical world by the mind of man today, and this process is continuing at a terrific pace. Man need no longer be a victim of external circumstance while there has been this conquest of external conditions, there is not the same time this strange spectacle of a lack of moral fiber and self control in a man as a whole conquering the physical world, he fails to conquer himself ^[9]. Nehru, with all passion for science and technology, and rationalism, never let an opportunity to go by without stressing the need for the development of the spiritual side of man. He firmly conceived that the two must walk together if human beings were to lead a life of peace and happiness.

Industrial development

Nehru's great zeal for science and for scientific approach could be seen from his expressions that "whenever chance offers I say something about the importance of science and technology, and we should realize that modern life is an offspring of science and technology.[10] It was clear to him that political freedom had to ensure social liberation and that becomes possible only through economic growth which invariably demands the fullest use of science and technology to achieve gainful results and exploit untapped natural resources of the land. He said that all his endeavors were to lift the mankind from its age-old state of bare subsistence level to a social level which provides security, material well being, opportunities for advancement and higher life to all; and these could be achieved through establishment of mighty projects, and heavy industries. These are necessary for not only economic development of India, but also for safeguarding its political independence and strengthening its defense. Though Nehru attached an undue importance to heavy industries, he did also realize the significance of small scale or cottage industries. In his scheme, there was a place also for both types of industries. He explained in the parliament that the argument one often hears against big industry, cottage and small scale industry is

misconceived. No doubt in this country we cannot raise the people's level of existence without the development of major industries. In fact we cannot even remain a free country certain things like rapid industrialization adequate defense, are essential for protection and maintenance of freedom and those cannot be achieved unless we develop industry in a major way. The development of heavy industry does not by itself solve the problems of millions in this country. We have to develop the village and cottage industry in a big way and while trying to develop both, one should not forget the human factor. For, we are not merely out to get more money and more production, but we ultimately want better human beings ^[11]. The gigantic industries of steel and iron, coal, oil refineries, and the ship-building industries established during Nehru's period have provided a strong industrial base to the country. He could for see that industrial development would influence Indian economy and the former by the application of science and technology.

Agriculture and Food production

India is predominantly an agricultural country, and, therefore, Nehru felt that unless the agricultural sector the health and living standards of Indian masses cannot be raised. Nehru observed that "we attach greater importance to agriculture and food, and matters pertaining to agriculture. If our agricultural foundation is not strong then the industry we seek to build will not have strong basis either. Apart from that the situation in the country today is such that if our food front cracks up, everything else will crack up too. Therefore, we dare not weaken our food front ^[12]. For him, planning, apart from the obvious objectives of raising living standards and bringing prosperity to our people, had a wider purpose of bringing our people into the middle of the 20th century and making India one of the leading countries of the world. It is obvious that modern agriculture with high levels of production, for example in America, where less than 10% of the population produce more than enough for the whole, is based on modern science and technology for it depends on machinery and giant dams and other steps taken to improve irrigation facilities. Production of better strains by scientific breeding and an abundant use of fertilizers is product of the chemical industry. He said how has agriculture grown in many other countries greatly, it is because of the application of science and technology and then we must seize hold of them, understand them and apply them ^[13]. The First plan (1951-56) faithfully followed this prescription and devoted 17.4% of its total expenditure to agriculture and community development. A major portion of the outlay on irrigation and power (27.2%) also naturally went to agricultural development. In contrast to this, only 8.4% of the plan expenditure was

devoted to Industry and 24% to transport and communication ^[14]. By the time the second plan (1956-61) was prepared, it was felt that the time had come to pay greater attention to industry and proper allocation to agriculture got reduced. Thus, Industry and mining got 183% of the total plan outlay and in addition 28.9% went to transport and communication department and 10% to irrigation and power ^[15].

It has, however, to be remembered that every decision has its Own costs and Nehru perhaps felt that he had no choice but to give higher priority to basic industries coal, steel, oil and machine building, in order to lay the foundations of a modern, self reliant economy in India, without which even agricultural development was not possible beyond a point, and which was absolutely necessary not only for rapid economic development but also for safeguarding the country's independence and society ^[16]. If today we are much less dependent on the advanced countries than most of the countries of the third world not merely in the economic field, but also in that of defense supplies, if manufactured goods are occupying an increasing share of our exports to various countries and if we have become self- sufficient in food production, it is due to modernization of agriculture. We owe all this in a good measure to the attention paid to the modernization of our economy during the Nehru era.

Modern scientific development

Nehru visualized that science and technology would be an effective instrument to tackle many pressing problems confronting India, from times immemorial and, therefore, ceaselessly strove for its development to ensure, setting up of a chain of national laboratories covering a wide spectrum of Science. He requisitioned the services of many eminent scientists ^[17]. He was primarily responsible for the establishment of about 30 research laboratories all Over India, and five Indian Institutes of technology at different centers. For development in the sphere of atomic energy, he sought the services of Homi Baba, and persuaded TATAS to set up Tata Institute of Fundamental Research in Bombay. His endeavors resulted in the establishment of Baba 'Atomic Research Centre and the at Energy Commission (1948). During the stewardship of Nehru, the expenditure on scientific research rose from Rs. 24 million in 1947 to Rs.550 million in 1964 ^[18]. If India today is one of the leading countries in the world with the third largest reservoir of trained scientific manpower in the world, and occupies a place among those countries, which are highly advanced in the use Of Atom power for peaceful purposes, it is largely because of the farsightedness and able leadership of Nehru.

India's science policy

The Government's commitment to science and technology was enunciated in the National Science policy resolution which was adopted by the Parliament in 1958. It was drafted by Pandit Nehru himself and it clearly brings out the significant role of science and technology and promotion of industrialization. Science and technology can make up for deficiencies in raw materials by providing substitutes or by providing skills which can be exported in return for raw materials. Development of Science & Technology can greatly reduce the drain on capital by reducing dependence on the import of plant and machinery, highly paid personnel and technical consultants [19].

The main aims of science policy are:

- 1) Foster, promote and sustain the cultivation of science and scientific research in all its aspects.
- 2) Ensure an adequate supply of research scientists and recognize their work as an important part in promoting the strength of the nation.
- 3) Engage and initiate programmes for the training of technical personnel to fulfill the needs of the country.
- 4) Encourage individual initiative in an atmosphere of academic freedom; ensure that the creative talent of men and women are encouraged.
- 5) Secure to the people the benefits that accrue from possession and application of scientific knowledge including the spirit of scientific attitude or temper.

Technology, as an extension of the science policy formulated in 1958, was announced in January 1983 at the Indian Science Congress session. Its major objectives are [20].

- 1) Attainment of technological competence and self-reliance (strategic and critical areas).
- 2) Promotion of gainful employment.

Upgrade the traditional skills to make them commercially competitive.

- 1) Ensure the correct mix between mass production technologies and production by masses.
- 2) Ensure maximum development with minimum inputs of capitals;

- 3) Conservation of energy.
- 4) Modernization of the existing technological equipments.
- 5) Ensure harmony with environment while pursuing all the above objectives.

Nehru had not only understood the process of development through science and technology, but he saw that adverse effects of science too. In this context, Nehru wrote that "Science is advancing far beyond the comprehension of a very great part of the human race and posing problems which most of us are incapable of understanding much less of solving ^[21].

Atomic energy programme

In the early days, though India supported the proposal of the Western powers on international control of atomic energy, Nehru was keen that Indian Government's Sovereign power for development of atomic resources should not be compromised ^[22]. In fact; the U.S.S.R., U.S.A. and Canada wanted that India should not manufacture nuclear weapons. Unmetered by the situation so created, establishment of the Department of Atomic energy, and the Atomic Energy Commission during Nehru era laid a strong base in the country for the development of atomic energy programmers. The chief objective of our Atomic Energy programme (AE Act of 1948) is the use of Atomic Energy solely for peaceful purposes, generation of electricity, and development of nuclear application in research, agriculture, industry, medicine and other areas like river valley projects. Commenting on nuclear technology of war, Nehru said that "today there is conflict in the world between two things the atom bomb and what it represents, and the spirit of humanity. That is the paradox of/the atomic energy-sputnik age. The fact that nuclear tests contain even though it is well-recognized that they are very harmful in the present and in the future, because of the fact that all kinds of weapons of mass destruction are being produced and piled up even though it is universally recognized that their use may well exterminate the human race, Science is advancing far beyond the comprehension of very great part of the human race and posing problems which most of us are incapable of understanding, much less of solving. Hence, the inner conflict and stimulate of our times. On the other-side there is the great and over powering progress in science and technology and of their manifold consequences on the other, a certain mental exhaustion of civilization itself. It is widely accepted today that nuclear power is economical and that it has to shoulder an ever increasing burden of the future power production in the country. When nuclear power was still in its infancy in the world and its economics

unknown, it caught the attentions of far seeing vision and imagination of a great man to embark upon an industrially backward Country on a programme of atomic research and development. However, the faith of Nehru in science and technology was not absolute. Nothing was more distant from his thought than this easy optimism-very frequently obtuse-of the fanatics of progress.

He knew that contradiction is not an accident but a law: the very substance of history and man himself. We solve our contradictions only to create others. In a lecture given in 1959 (Azad Memorial Lectures) he warned us of the dangers of the modern age with great clarity:- The Welfare State is a worthwhile ideal, but it may well be rather drab and the examples of States which have achieved that objective bring out new problems and difficulties, which are not solved by material advance alone or by a mechanical civilization. Religion has played an important part in supplying some essential needs of human nature. But that type of religion has weakened its hold and is unable to meet the onslaught of science and rationalism. Whether religion is necessary or not, a certain faith in a worthwhile ideal is essential to give substance to our lives and to hold us together. We have to have a sense of purpose beyond the new, material and physical demands of our daily lives. Socialism and communism attempt to give this sense of purpose, but they have tended to develop dogmas of their own. Communists have become the metaphysicians of the present age ^[23]. In the same speech, the poet and artist that he always was, rebels against the sterility and spiritual poverty of the affluent society-A life divorced from Nature and more and more dependent upon mechanical device, begins to lose its flavor and even the sense of function leaves it. Moral and spiritual disciplines break up, and some kind of disillusion follows with a feeling that something is wrong with our civilization. Some people talk of going back to Nature and to the simpler life of the ancient days. But whatever virtue there is in this, there can obviously be no going back, for the world has changed. The individual loses himself in the mass and tends to become merely an instrument in a complex setup which is constantly aiming at social and economic improvements of the group as a whole. In contrast to the majority of the political leaders of this century, Nehru did not believe that he held the keys of history in his hands. Because of this, he did not stain his country or the world with blood. For the same reason, he neither offers us pre-fabricated solutions to the conflicts between industry and private life. He thought that modern society can find an answer to these antagonisms by itself. The alternative was spiritual and physical death. He saw in the history of India an example and not a model. The past was, for him, a stimulus and not something that we

could repeat). In the Mauryan age, Indian civilization attained a synthesis between the Greek and Persian cosmopolitan influences and its own tradition. A similar attempt-but partially aborted-had also been made by the Mughal Empire, especially under Akbar. At the end of his life Nehru asked himself can we combine the progress of science and technology with this progress of the mind and spirit also? We cannot be untrue to science, because that represents the basic fact of life today. Let us then pursue our path to industrial progress with all our strength and vigor and, at the same time, remember that material riches without toleration and compassion and wisdom may well turn to dust and ashes....|| It is remarkable that Nehru, in spite of his mainly being a political figure, did not fell into the temptation of suppressing the contradictions of history by brute force or with a verbal -tour de passé||. He does not offer solutions; he shows us the way to find them. I emphasize this trait of his thought and character because it is unique in our world of fanatical Manichaeans and hangmen masked as philosophers of history [24].

Conclusion

Jawaharlal Nehru, a man of India's destiny was well-known throughout the world and in his own country. For him science was an essential and a basic component to transform an economy of scarcity into one of abundance, and from traditionalism to modernism, the direction in which the whole world is now running. He understood the other world's progress that it is due to attainment of superiority in science and technology and those who have most indigenous techniques are maintaining the world order. He was convinced that India's progress and prosperity in all fronts lay in the establishment of vast and firm scientific managerial and technical base. Nehru's attitude towards life was based on scientific spirit and rationality. He was convinced that scientific method and approach alone can revolutionize human life. He visualized that establishment of a strong industrial base for promotion of economic development, and achievement of self sufficiency in the spheres of Agriculture, and food production was possible only through fullest use of science and technology. His ceaseless efforts to building adequate trained scientific manpower to be on par with those countries which are highly advanced, and formulation of an aggressive science and nuclear policy that can reduce dependence on foreign men, material and machinery, carved a place of eminence not only for himself, but also for India and her people as a whole. The great contribution of the towering personality would serve as a beacon light not only to the present but also to the future generation.

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Chapter - 2
Information Literacy Programmes and Practices:
A Survey of Selected Academic Institutions of
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Chapter - 2

Information Literacy Programmes and Practices: A Survey of Selected Academic Institutions of Yadagir District (Karnataka State)

Dr. Somanath Mudda and Basawaraj Malipatil

Abstract

Information literacy (IL) is the set of skills that allows us to find, evaluate and use the information we need. Libraries have long been involved in training their users in library use, its services and sources. Programmes such as library orientation, user education, etc. organize by libraries to teach the user how to use library, how to search information sources and how to access information in the digital age. Information literacy is critically important in present age, because we are surrounded by a growing ocean of information in all forms. Research in this area in developing countries such as India is still in primary stage. This paper is a case study of position of information literacy in selected libraries of higher institutions of division. The survey found out that only 14.28% of respondents conduct IL training at regular basis and 35.71% of respondents conduct IL training only for new users. The present study demonstrates various aspects of information literacy such as frequency of IL programmes, organization of IL programmes, instructional materials for IL programmes, IL programmes for different category of users, problems in effective delivery of IL training, resources required for IL program, techniques and methods used in IL programmes.

Keywords: Information literacy, information literacy programmes, academic institutions of Yadagir district

1. Introduction

Information literacy is the ability to know when there is a need for information, to be able to identify, locate, evaluate and effectively use that information for the issue or problem at hand. Library has long been involved in training their users in library use, its services and sources. Information literacy forms the basis for lifelong learning. It is common to all disciplines, to all learning environments, and to all levels of education. It enables

learners to master content and extend their investigations, become more self-directed and assume greater control over their own learning. Association of College and Research Libraries. (1989). Presidential Committee on Information Literacy: Final Report. Retrieved from "To be information literate, a person must be able to recognize when information is needed and has the ability to locate, evaluate and use effectively the needed information. This study is an attempt to explain the need for user education is based mainly on the belief that to know how to use a library was an essential part of the education. The main object of user education revolved on the many sources of information available and not on the mechanism of using the system. In addition to teaching how to use library, find information librarians now to recognize the importance of teaching critical thinking skills to enable users to evaluate and select the best information for their need. Data Smog is a term coined by author David Shenk that refers to the idea that too much information can create a barrier in our lives. This data Smog is produced by the amount of information, the speed at which it comes to us from all directions, the need to make fast decisions without having all the information that is available we need. Information literacy is the solution of Data Smog. It allows us to cope by giving us the skills to know when we need information and where to locate it effectively. The growth in the interdisciplinary subjects an important factor for the development user instruction. Academic libraries undergone rapid collection growth and acquired new techniques of organization and retrieval. The quantity of material to search because of the diverse discipline requires that effective instructions method should be developed. It is not just the quantity of material that makes help essential but also the diversity of the sources, and formats. In the digital age, fencing around library resources is a daunting task. Moreover, the instructional needs of user have changed dramatically as new methods for teaching and learning have emerged. While information sources and methods for finding information are still a useful component of library instruction, a broader construct of information of information literacy has emerged skill in new learning contexts. There are many ways to understand these new dimensions of learning and associated skills.

One of these is the need for a conceptual understanding of information and knowledge processes. Another is the need for skills to exploit technology to use information effectively.

2. Scope of the study

The scope of this study is limited to selected higher institution libraries at Yadagir district only. The result will contribute in knowing the

implementation status of information literacy programmes in the selected libraries. The result might have implications for librarians to better organize their information literacy programmes and for users to better understand their own skill levels and their need to ask librarians for help. Administrators and faculty members may consider incorporating IL instruction in the regular curriculum.

3. Objectives of the study

- a) Understand the implementation status and developing trends in IL programmes.
- b) Know the availability of ICT infrastructure in the libraries selected for study.
- c) How to information literacy programmes are planned, designed and delivered.
- d) Know the difficulties in planning, designing and running the IL programmes.
- e) Know the impact of IL programmes on the utilization of library resources.
- f) Know the impact of IL programmes in enhancing the intellectual output of the institution.

4. Methodology

The questionnaire method has been employed to collect the data from selected libraries of higher institution of Yadagir district. Questionnaire was circulated to 24 selected libraries out of which 21 respondent. Among 21 respondents, 7 respondents indicated that they do not have any information literacy training or instruction to their users. So, these 7 libraries were excluded and only 14 libraries were considered for data analysis and interpretation

5. Data analysis

5.1 Information literacy programmes

5.1.1 Frequency of information literacy programmes

All the 14 libraries selected for survey provide IL programmes for the purpose of maximum utilization of library resources and services. Information Literacy programmes are quite familiar in academic libraries while in R &D sectors IL programmes are not conducted at frequent interval (Table 1).

Table 1: Frequency of Information Literacy Programmes

Frequency of IL Programmes	Number of Libraries	Percentage
Regular interval	02	14.28
Annually	03	21.42
When required	04	28.57
For new users	05	35.71

5.1.2 Organization of information literacy programmes

Table 2 shows that respondents have understood well their duties. In majority (71.42) of libraries, it is the librarian who conducts IL programmes. Some of the libraries (28.57) conduct IL programmes by library staff. Separate staff is not available for IL programmes in any library.

Table 2: Organization of Information Literacy Programmes

IL Programmes are conducted by	Number	Percentage
Librarian	10	71.42
Librarian Staff	04	28.57
Separate staff is available for IL Programmes	-	-

5.1.3 Instructional materials for IL programmes

Table 3 show that 42.85 percent respondents indicated that they have developed instructional material including tutorials or modules. Whereas 11 (78.57 percent) of respondents have developed resources as instructions sheet, guides and manuals for the proper understanding and utilization of the resources of the libraries and 14.28 percent of respondents revealed that they have developed WebPages and intranet portal for providing IL Programmes.

Table 3: Instructional materials for IL Programmes

Instructional Materials	Number	Percentage
Instructional materials including tutorials or modules	06	42.85
Resources help sheet, guides and material	11	78.57
WebPages and intranet portals	02	14.28

5.1.4 Programmes for different category of users

Table 4 shows that 21.42 per cent respondents indicated that they conduct IL programmes for scientist/engineers/IT staff, 14.28 percent conduct IL program for administrative staff, 28.57 per cent IL Program for faculty members and majority of librarian (71.42) conduct IL program for students.

Table 4: IL Programmes for different category of users

Category of users	Number	Percentage
Scientist/Engineers/IT Staff	03	21.42
Administrative Staff	02	14.28
Faculty	04	28.57
Student	10	71.42

5.1.5 Problems for effective delivery of IL

Table 5 shows that the time available for library staff to perform IL training is the major issue. This is expressed by 57.14 respondents. This problem can be solved by appointing separate staff for planning and delivering IL programmes. Whereas 35.71 per cent respondents indicate that user resistance is also a hurdle for effective delivery of IL programmes, 28.57 per cent respondents indicate the problem quality products and 42.85 per cent respondents revealed that staff expertise in one of the serious problem for effective delivery of IL program.

Table 5: Problems for effective delivery of IL

Problems for effective delivery of IL	Number	Percentage
Lack of quality products	04	28.57
User resistance	05	35.71
Staff time	08	57.14
Staff expertise	06	42.85

5.1.6 Resources required for IL programmes

Table 6 shows that 21.42 respondents indicated the requirement of additional staff to conduct the IL training, 7.14 per cent respondent indicated requirement of separate training room for IL programmes. Whereas 21.42 per cent respondents expressed that training for the staff (trainer) is very important, 14.28 per cent respondents revealed the lack of funds for IL program and 14.28 per cent respondents indicated the requirement of modern electronic gadgets.

Table 6: Resources required for IL programmes

Resources required	Number	Percentage
Additional staff to plan or conduct training	03	21.42
A separate training room outside the library	01	07.14
Training for the staff how to teach	03	21.42
Funding	02	14.28
Printed training manuals	05	35.71

Modern electronic gadgets	02	14.28
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5.2 Training aids used for IL programmes

5.2.1 Techniques used in developing IL programmes

Table 7 shows that large majority (92.85%) of respondents revealed that interaction is the best techniques in developing IL Programmes and 28.57% respondents used video techniques in their IL programmes. Five (35.71%) respondents have used multimedia techniques into their IL programmes.

Table 7: Techniques used in developing IL Programmes

Techniques used	Number	Percentage
Interaction	13	92.85
Audio	-	-
Video	04	28.57
Multimedia	05	35.71

5.2.2 Methods used in IL programmes

Table 8 shows that large number (85.71%) of respondents have indicated face to face as the most favoured method of delivering IL instructions, 28.57% used printed training material for delivering IL instructions and 35.71% respondents revealing lectures or demonstration as other favoured alternatives for IL instructions.

Table 8: Methods used in IL Programmes

Methods used for IL programmes	Number	Percentage
Face-to-face	12	85.71
Printed training material	04	28.57
Lectures/Demonstration	05	35.71

5.3 Information literacy programmes assessment

This part is designed to show the overall perception of information literacy concept among the selected libraries (Table 8). It is designed in three-point scale format so as to get understanding level of information literacy concept among the respondents through some basic statements available in the literature.

The analysis of data is following:

- 1) All respondents agreed that to measure the effectiveness of the IL programmes relevant research, services reviews or assessment should be carried out.

- 2) Eleven (78.57%) respondents agreed that IL programmes help in increased visits to the library by the users.
- 3) All (100%) respondents agreed that IL programmes help search skills within the areas of research interest.
- 4) All respondent agreed that IL programmes are necessary for effective utilization of library resources.
- 5) Twelve (85.71%) respondents agreed that IL programmes help in increasing research output of the users and organization.
- 6) Eleven (78.57%) agreed that IL programmes help in understanding economic, legal and social issues surrounding the use of information.
- 7) 92.85% of respondents agreed that IL programmes should be evaluated from time to time in view of their relevance in the fact technological and subject developments.
- 8) All (100 per cent) respondents agreed that IL is helpful today, as much of the information is available in electronic format.

Statement	Disagree	Agree	No Opinion
To measure the effectiveness of the IL programmes, relevant research, services reviews or assessment should be carried out.	-	14	-
IL programmes help in increased visits to the library by users.	02	11	-
IL programmes help search skills within the areas of research interest.	-	14	-
IL programmes are necessary for effective utilization of library resources.	-	14	-
IL programmes help in increasing research output of the users and organization.	01	12	01
IL programmes help in understanding economic, legal and social issues surrounding the use of information.	02	11	-
IL programmes should be evaluated from time to time in view of their relevance in the fast technological and subjects developments.	-	13	01
IL programmes are helpful today, as much of the information is available in electronic format.	-	14	-

6. Findings

Major findings of the survey are:

- 1) Maximum respondents (35.71%) conduct IL programmes only for new user while minimum respondents (14.28%) conduct IL programmes at regular interview.

- 2) In majority of libraries (71.42%) librarians are conducting IL programmes.
- 3) Maximum respondents (78.57%) have developed resources as instructions sheet, guides and manuals for proper understanding and utilization of the resources of the libraries.
- 4) Maximum (71.42%) respondents conduct IL programmes for students and 28.57% respondents conduct IL programmes for faculty.
- 5) Maximum respondents expressed that major problem for provide IL program is lack of time and expertise staff.
- 6) All respondents expressed different view about the requirement of resources for IL programmes.
- 7) Majority (92.85%) of respondents revealed that interaction is the best technique in developing IL programmes.
- 8) Large number (85.71%) of respondents indicated that face to face as the most favoured method of delivering IL instruction.
- 9) All respondents agreed that IL programmes are helpful today, as much of the information is available in electronic format.

Suggestions

Information Literacy should be included in initial and in service training programmes, and be available as part of teachers ongoing professional development. IL does not by any means have to be a high tech enterprise, but it should at least reflect the levels of access that students, teachers, administrators and engineers have to technology outside the campus environment. IL programmes should be made a regular activity in the higher learning, R & D and industrial libraries. Library professionals are slowly and steadily familiar with the technological gadgets and showing interest in guiding the users in the information search and accessing the information through many means. Librarians should be collaborated with section such as computer and administrative divisions including teaching. The copy right issues related to electronic information access and use should also form part of the IL programmes.

Conclusion

Information Literacy is the ability to access, evaluate and uses information from a variety of sources is central to all successful learning and by extension to all successful living. IL and digital literacy are central topics for the information science. They are associated with issues as varied as

information overload, lifelong learning and growth of the information society. The mission of information literacy is never ending. To cope-up with the growth of knowledge, user's time is effective utilization of information and communication technologies in planning, designing and delivering of information literacy programmes. Guidance should be provided in locating, accessing, evaluating and effectively using electronic information available on the internet Librarian can emerge as the leaders in motivating the users in the academic and research environment to become lifelong learners. Network technologies should be used to a maximum coverage for effective of IL programmes.

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Chapter - 3

LOOP Features for Signature Verification

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Chapter - 3

LOOP Features for Signature Verification

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Abstract

Signatures are widely used as a means of personal identification and verification. Many documents like bank checks and legal transactions require signature verification. Signature-based verification of a large number of documents is a very difficult and time consuming task. Consequently an explosive growth has been observed in biometric personal verification and authentication systems that are connected with quantifiable physical unique characteristics. The objective of signature verification systems is to discriminate if a given signature is genuine (produced by the claimed individual), or a forgery (produced by an impostor). In this research work, we have collected both male and female 40 student's signatures and made different set of 2 datasets. We propose a different methodology such as LOOP as a texture descriptor, to extract the features from the input signature images and verify the input image signature is original one or the forgery.

Keywords: LOOP, signature SVM

I. Introduction

Signature verification problem which is considered to be an important research line in the field of pattern recognition. A signature is a gained behavioral biometric of a user to declare his/her unique identity on printed documents. The demand of authorization based on signature is increased including credit card validation, security systems, banking system, checks, contracts, etc., it is widely used as proof of identity and a socially accepted authentication method in daily life. The system stakeholders are person, organization or banks that need to verify signatures. The stakeholders are Bank's customers who must write their signature and bank's employees have to verify if the sample signature is the original signature in database, to complete any transaction required on that account. Another customers are organizations' employees: any organization that still depend on paper works, employees must take supervisor's signature Automatic signature verification

system compete the current visual verification that depends mainly on the experience, mood and working environment of the verifier. Moreover, it is difficult for the eyes of any experts to precisely verify the ratios between lines and angles of a genuine signature to a fraud signature. One reason is that signature is just a special way of handwriting that contains complex geometric patterns and often unreadable plots.

This research aims to consider a more reliable system which reduce fraud in all related financial transactions sectors. Which will be implemented with image processing and machine learning techniques, in which once the image of a handwritten signature for a customer is captured, several pre-processing steps are performed on it including filtration and detection of the signature edges. Afterwards, a feature extraction process is applied on the image to extract morphological features, texture and spatial features and a verification process is developed and applied to compare the extracted image features with those stored in the database for the specified customer.

The remaining of this paper is as follows. In Section 2, we proposed our method. In Section 3, we described the databases which are used for experiment purpose and detailed experimental results. In Section 4 summarized the importance of our proposed work and highlighted future directions.

II. Literature review

Handwritten signature verification is one of the interesting topics in the research field. Here we are summarizing some of the methods which are already introduced to verify the signatures to this world through articles.

Sharif, M., Khan *et al.* ^[2] 2018, compared three datasets namely MCYT, GPDS synthetic and CEDAR for verification of signatures by applying local features (angle, centroid, distance and slope) and Global features (area, aspect ratio, pure height, pure width and Best feature selected with the help of Genetic algorithm and used ANN method with combination of SVM classifier an achieved an AER: 7.88%, 12.50 and 5.95%.

Soleimani, A., *et al.* ^[3] 2016, used Discrete Radon Transform Features and Histogram of Oriented Gradients to verify the signatures by applying deep multitask metric learning on UTSig MCYT-75 and GPDS 960 Gray Signatures and achieved EER Of 20.94% 15.08% and 22.76%.

In this paper Authors ^[4] 2017 compared the four datasets namely GPDS-160, MCYT, CEDAR and Brazilian PUC-PR datasets of Signature images for signature verification by applying CNN-5 layer method to classify the

signatures with the help of SVM classifier and achieved an EER of 1.72% for GPDS-160, for MCYT an EER of 2.87%, for dataset CEDAR 4.63% and, Brazilian PUC-PR datasets 2.01% accuracy.

Jagtap, A.B *et al.* [5] used GPDS dataset for signature verification and achieved an accuracy of 86.47%.

In this paper Karouni, A *et al.*, 2011 [6] used 100 signatures images as the dataset they extracted features are area centre of gravity eccentricity kurtosis and skewness then applied ANN method to classify the dataset and achieved accuracy of 93%.

This paper states that Yilmaz, M.B *et al.*, 2011 [7] using GPDS 160 as dataset to verify the signatures LBP and HOG used as feature extraction method then applying SVM classifier achieved an error rate 15.41%.

In this paper Khalajzadeh, H. *et al.*, 2012 [8] verify the signatures authors created their own Persian signatures dataset and applied advance CNN on dataset and achieved an accuracy of 99.86%.

Here Ferrer, M.A *et al.*, 2012 [9] used two different dataset namely MCYT and GPDS960, features are extracted from the Texture features (LBP) and achieved an EER: 24.78%.

Bhattacharya, I., *et al.*, 2013 [10] created personal dataset and experiment is done on Pixels with Pixel matching technique (PMT) and received an Accuracy of 94%.

Neamah, K *et al.*, 2014 [11] used GPDS-160 dataset which is used to verify the signatures with the help of features gravity center point feature graph and achieved an accuracy of 17.4%.

Kruthi, C., & Shet, D.C. *et al.*, 2014 [12] created own dataset which consists of 336 signatures and verified the signatures by using Gravity center, loops count measured, horizontal/vertical profiles features and calculated normalized area, centroid then applying SVM classifier achieved an EER: 7.16%.

Guerbai, Y *et al.*, 2015 [13], experimented to verify the signatures original or forgery one, on two datasets namely GPDS-160 and CEDAR and extracted features are Curvelet transform (Genuine signature only) and applying one class SVM (OCSVM) achieved an AER:16.92% on GPDS dataset, 8.70% on CEDAR dataset.

Hatkar, P.V *et al.*, 2015 [14] created 1000 signature images dataset by applying Neural Networks method to classify the signatures and achieved an accuracy of 86.25%.

Hamadene, A., & Chibani, Y *et al.*, 2016 ^[15] CEDAR, GPDS 300 Directional Code Co-occurrence matrix (DCCM) One-class writer-independent method utilizing tests of feature dissimilarity (FDM) classification and thresholds and a smaller number of references AER:18.42.

Rantsch, H., *et al.*, 2016 ^[16] used Dutch ICDAR SigWiComp 2013 dataset, to classify the signatures original or forgery one, by using CNN10 conv layer and Euclidian distance achieved 81.76% for Dutch Dataset and 93.39% for ICDAR Dataset. They mixed triplets of two genuine and one forged signatures for the experiment.

Soleimani, A., *et al.*, 2016 ^[17] Used ICDAR 2011 Sig Comp Dataset of signature images applied VGG 16 and achieved an accuracy of 97% for Dutch Dataset and For Chinese dataset achieved an accuracy of 95%.

Alvarez, G. *et al.*, 2017 ^[18], used CEDAR, GPDS300, GPDS synthetic, Bengali, Hindi Signature images applied Siamese Neural Network using Euclidian distance achieved an Accuracy for CEDAR 100%, GPDS300-76.83%, GPDS synthetic 77.76%, Bengali 86.11, Hindi 84.64%.

Yapici, M. *et al.*, 2019 ^[19], used three different datasets namely GPDS synthetic (185 user-4070), BME2(31 user-860), SVC20 (20use r-360) Signature images to classify the signature as original or forgery by applying CNN and classifier used was cubic SVM and achieved an accuracy of 97.7%, 99.4%, 100%.

Jagtap, A.B *et al.* 2019 ^[20] used GPDS 1000 Signature images and applied inception v1&v3 to classify the signature images and achieved an accuracy of 83% for v1 and 75% for v3.

Sam, S.M *et al.*, 2019 ^[21] compared the datasets which are CEDAR, BHSig260 signature corpus, and UTSig. Dataset of signature images to classify the signatures with the help of CNN and achieved an accuracy of CEDAR-100%, BH26 0 hindi-95.40%, for benagali-97.77% and for UT sig-80.44%.

Mohapatra, R.K *et al.*, 2020 ^[22] used ICDAR 2011 SIG COMP signatures images applied explainable deep learning method an and achieved an accuracy in the range of 94.37 to 99.96%.

III. Proposed methodology

To recognize the signatures follow these steps:

- 1) Acquisition
- 2) Preprocessing

- 3) Features extraction
- 4) Recognition

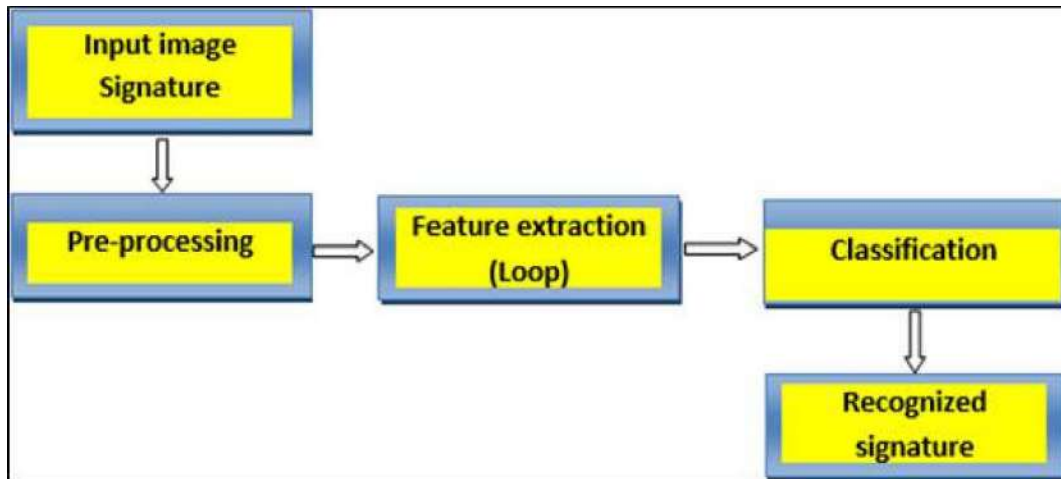


Fig 1: Flow-Chart of proposed methodology

- 1) **Acquisition:** In this step the input image, has to be captured. In our case input images are handwritten signatures of students and which are captured with the help of scanner of 300dpi.
- 2) **Pre-processing:** In a pre-processing step, commonly the input image is normalized, converted into RGB to gray and segmented by applying some basic morphological operations. In our case, the image is coloured image.
- 3) **Feature computation:** In this step, the LOOP descriptor is used as a feature extraction method to extract the features from the signatures images.

LOOP is nothing but the local optimal oriented pattern it is mainly used for binary images. it is similar to LBP features and it produces 256 features on and the histogram is calculated and drawn in one cell. Loop feature extraction overcomes the disadvantage of LBP methods and improves both time complexity and accuracy.

- 4) **Classifier:** In this step on applying classifier to the datasets, the signatures will be classified. Here we have applied the SVM classifier which is, simple classifier and classifies the data on plotting hyperplane if the data are linear in fashion, if the data are non-linear it uses a kernel function to classify the data.

IV. Dataset

Here we have collected 40 students signatures and made two different datasets one set is made of original signatures and another set is of forged signatures, a total of two classes (428) signatures, signature original dataset consists of 209 signatures and forged dataset consists of 219 signatures.

Some of forged signatures



Fig 2: Forged signatures of both male n female students

Some of original signatures

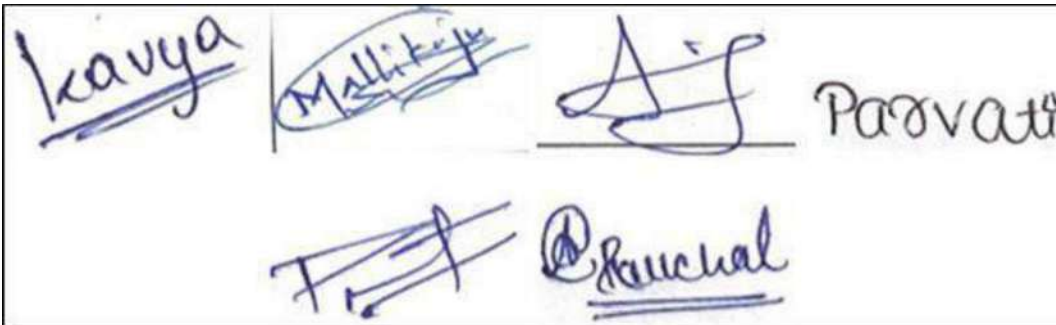


Fig 3: Original signatures of both male n female students

V. Results and evaluation

To evaluate and exhibit the performance of the proposed method we have used two sets of Datasets which are original signatures and forged signatures, the sample from the dataset is shown in Fig. 2 and 3. The training and testing tests are automatically divided with the 5 fold cross-validation to evaluate the performance of our proposed method, this data is spited into 5 equal-sized subparts, one part is used for validation and another four, parts are used for training, and this process is repeated for all two classes and single value result is calculated by averaging all results. We have defined accuracy for each signature as follows: class wise recognition accuracy for each signature is shown in the following Table1. For deeper analysis, we have shown the confusion matrix in Table 1. In Table 2.

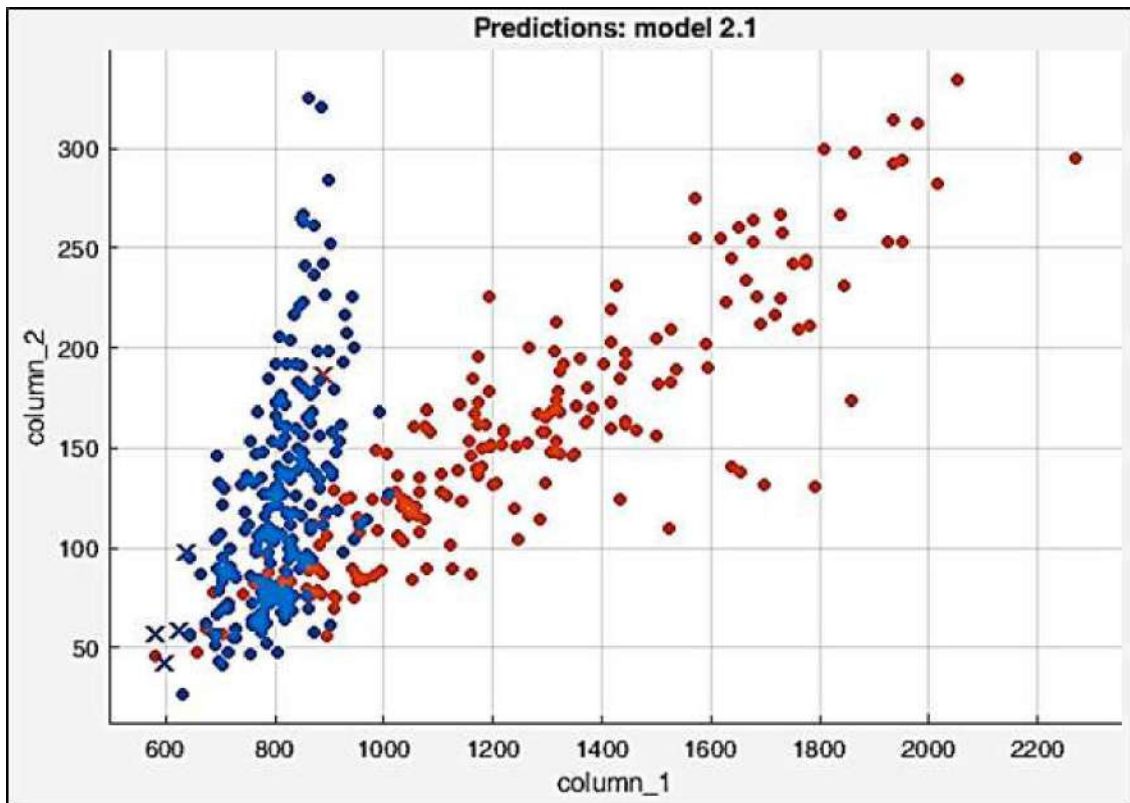


Fig 4: Result of Classification of signatures



Fig 5: Confusion matrix for LOOP method

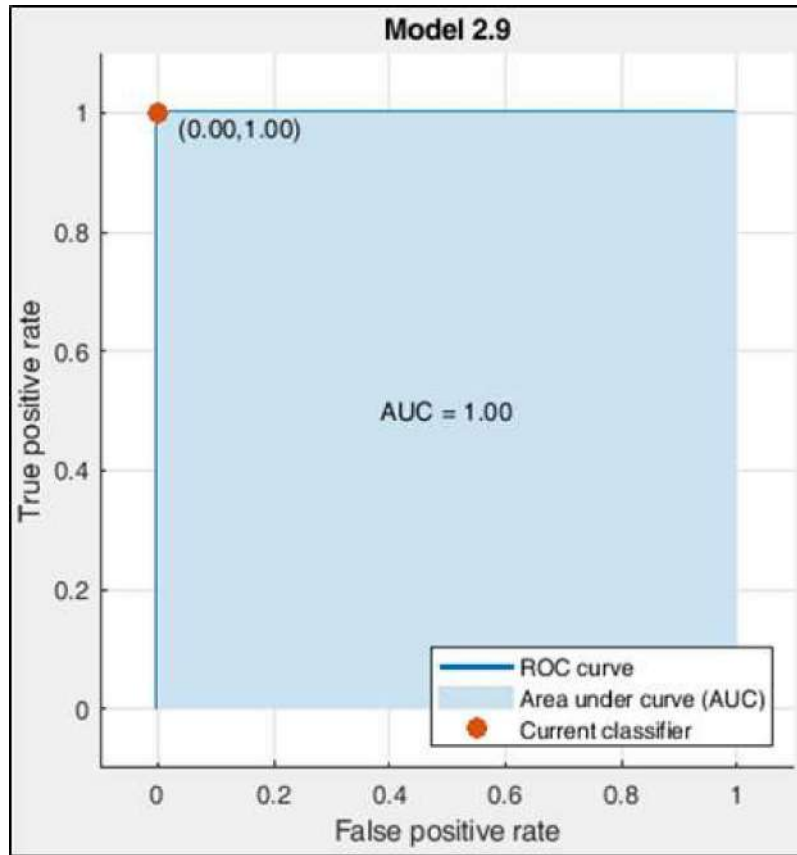


Fig 6: Roc curve for SVM classifier on classification of signatures

Table 1: Comparison with similar work

Method	Classifier	Dataset	Accuracy
LOOP (Our method)	SVM classifier	Our Own Personal dataset of both male and female 40 students consists of 428 signatures. (Two classes)	100%
Gravity center, loops count measured, horizontal/vertical profiles features	SVM classifier.	own dataset which consists of 336 signatures	93%

Table 2: Recognition accuracy of our proposed work

S. No	Class	Total signatures	Recognized signatures	Accuracy
1.	Original signatures	209	209	100 %
2.	Forged Signatures	219	219	100 %
	Over All	428	428	100%

VI. Conclusion

In this paper we have introduced a method namely textural descriptors such as LOOP to recognize the handwritten signatures of the students, and checked is it is original or forgery one. These LOOP features are tested with simple SVM classifiers with city block distance. Experimental results have

shown promising 100% accuracy in the classification of original and forged signatures. In the future, we will extend our study to a variety of signatures with other sophisticated classifiers.

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Chapter - 4
Statistical Analysis of Service Quality and
Customer Satisfaction towards Mobile
Communication Service Providers: Evidences
from Bidar District

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Chapter - 4

Statistical Analysis of Service Quality and Customer Satisfaction towards Mobile Communication Service Providers: Evidences from Bidar District

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Abstract

Indian Telecommunication sector has golden history of more than 160 years. The advancement in technology raised the standards of communication media. Thanks to the wireless communication technology which made a world as global village. India stands second largest telecom industry after china. It also serves as one of the biggest market place for telecom industry and contributing in India's GDP growth.

In this paper, we have studied the role of service qualities provided by the telecom service provider, regular innovations in services as per the growing needs of the customer and network quality on the customer satisfaction and loyalty. To understand the role of different factors thoroughly, we have collected the data of 205 young students studying in different colleges at Bidar District of Karnataka. The collected data is systematically analysed with different statistical tools and interpretations are presented for deeper understanding.

Keywords: Telecommunication service providers, service quality, network quality, brand loyalty, customer satisfaction

1. Introduction

India has a golden history of 160 years in the sector of telecommunication. The first telecom line was started in British Period in Kolkata in 1858. Advances in Information and Communication Technology has grown over the years tremendously and serving as one of the most promising sectors in Business. India stands as second biggest telecom network in the world with 1.179 billion subscribers as on 31, July 2018. Interestingly, India has lowest call tariffs in the world, hence provided the opportunity for the competition among different telecom operators. India also has second largest INTRNET users in the world with 460.20 broadband subscribers. The statistical facts and

figures show that, India has overall population of 130 crore people out of which 56 crore (43% of total population) having smartphones or basic mobile phones, this led to 51% growth in e-commerce.

With more than 56 crore users, India have one of the largest markets in telecom sector and it also created a huge potential for competitions among the different service providers, some major players in industry are named here, such as Airtel, BSNL, Jio, Idea, Tata Docomo etc.

2. Related Work

In this paragraph, we have briefed the related literature reported in past decade in the context of customer satisfaction with respect to the telecom sector. Author in ^[1] investigated that, how customer satisfaction influences the customer loyalty. The adjustment effect of switching barrier is also analysed on customer satisfaction. To test the hypothesis about switching the barrier, 350 volunteer's data is collected and analysed to support the claims. Authors in ^[2] proposed a model to analyse Customer retention, loyalty and satisfaction and their impact on economic success on German telecom market. They have considered the opinions collected through structured survey from 684 residential. The LESERAL model is employed to analyse the data. SERVQUAL model presented in four for identification specific industry attributes and the special culture of China. They also studied the effect of customer value on the relationship between service quality and customer satisfaction which is followed by the examination of their influences on behaviour intentions of customers ^[3]. In order to investigate the relationships between service quality, value, image, satisfaction and loyalty in China, this study suggests and examines an integrated model. An analysis of survey data from 118 customers of a Chinese mobile communications company shows that perceived value and image perceptions are directly influenced by service quality that satisfaction is influenced by both value and image, that corporate image affects value and that both value and satisfaction are important predictors of loyalty. Value thus affects customer loyalty both directly and indirectly (through satisfaction) ^[4]. 1,662 Turkish mobile phone customers were surveyed for their data. Structural equation modelling (SEM) was used to evaluate the data and test all of the connections between the model's variables ^[5]. The authors investigate the impact of customer satisfaction, emotional commitment and calculative commitment on retention in a research of telecommunication services. The study also looks at the possibility of situational and reactionary trigger factors moderating the link between retention and satisfaction. The findings show that factors including calculative commitment, past turnover and customer satisfaction consistently have an

impact on retention ^[6]. The authors established customer categories and then analysed the heterogeneity in the satisfaction-loyalty relationship among the various segments. They also looked at the moderating influence of switching costs in the customer satisfaction-loyalty link ^[7]. The results also point to three components that make up SERVQUAL's dependability dimension a fault-reporting centre, response time and restoration time all of which are strongly correlated with customer happiness ^[8]. This study classifies changes in a customer's status from active use (regularly using the service) to non-use (temporarily choosing not to use it without having yet churned) or suspended (being suspended by the service provider) as partial defection and changes from active use to churn as total defection. This analysis and discussion focus on the implications of the mediating effects of a customer's partial defection on the link between churn drivers and total defection ^[9]. In this study, scientists analysed self-reports from 9249 respondents between the ages of 19 and 45 (74.55% of whom were male). To gauge e-SQ in the telecom sector, a scale made up of five user experience dimensions functional completeness, performance, interface and interaction quality, content and information and support or service was devised ^[10]. Through the mediating function of customer bonding, this study looked at the effects of service quality and service value on customer satisfaction. Data were gathered using self-administered questionnaires. Customer bonding partially mediates the correlation between Service Value and Service Quality with customer contentment, according to mediation analysis of the relationship between Service Value and Service Quality and customer satisfaction ^[11]. This study looked into the significance of handset subsidies, OTT apps, service quality, and legal frameworks for mobile telecommunications in Vietnam ^[12]. This study found that the existence of CSR activities in connection to business strategy had a big influence on how highly workers and consumers regarded the company. It was also discovered that adhering to CSR generates an internal dynamic to the company's internal image and that using it as a strategy enables one to present a favourable picture toward the exterior image of the consumers ^[13]. In order to better understand the link between service quality and consumer behaviour intentions in the Indian telecom service industry, this study first analysed customer expectations and perceptions of service quality delivery ^[14]. This study sought to identify the aspects or elements that influence rural Indian mobile subscribers' customer satisfaction scores. Analysis has been done on how several service factors, such as Service Quality, Service Performance, Support Services, Billing Services, etc., affect Customer Satisfaction Index ^[15]. In this paper, a robust modified SERVQUAL based multi-criteria decision making (MCDM) method is used to evaluate the

quality of service and its interaction with the dynamics of customer satisfaction.

From the aforementioned paragraph we can see that, lot of work has been presented for international market and few studies in Indian context. In this paper we analysed the data with very basic statistical tools to identify the relationship between customer satisfaction and services provided by telecom operators.

3. Research methodology

Research design: Exploratory research was used in this study to identify the various aspects influencing rural mobile telecom subscribers' customer satisfaction index by gathering preliminary data.

Data collection: The data for this study was collected during 2018-2020 gathered through an undisguised questionnaire It was pretested several times among various sample units in order to verify face validity of the items. The survey was conducted through online forms distributed among the students of various programmes in healthcare, engineering, pharmacy, management and fine arts etc.

Data analysis: was done using SPSS software. The statistical analysis method employed is ANOVA and Basic Descriptive Statistics.

4. Data Analysis and Finding

Hypotheses

Hypothesis 1: Relationship between service rates on enhancement of customer loyalty

H01: There is no relationship between service rates on enhancement of customer loyalty

HA1: There is a relationship between service rates on enhancement of customer loyalty

Hypotheses 2: Relationship between customer services is powerful on customer problems get resolves rapidly

H01: There is no relationship between customer service is powerful on customer problems get resolves rapidly

HA1: There is a relationship between customer service is powerful on customer problems get resolves rapidly

Analysis 1

Above analysis shows the relationship between service rates are moderate as per customer needs on customer loyalty. We tested the cases with Pearson correlation 2-tailed test. In above correlation test, correlation significant level is set at 0.01 level in 2 tailed. Test gives the significant level 0.004 which is lesser than 0.01 thus hypothesis is accepted. So, from the above test and significance level it shows that there is a relationship between service rates are moderate as per customer needs on customer loyalty. Service rates are reasonable then there may be the chances of enhancement of customer loyalty.

Analysis 2:

Above analysis shows the relationship between customer service is powerful on customer problems get resolve rapidly. We tested the cases with Pearson correlation 2-tailed test. In above correlation test, correlation significant level is set at 0.01 level in 2 tailed. Test gives the significant level 0.00 which is lesser than 0.01 thus hypothesis is accepted. So, from the above test and significance level it shows that there is a powerful relationship between customer service is powerful on customer problems get resolve rapidly. The quality of customer support service is powerful then customer gets problem solved rapidly.

Table 1: Descriptive Statistics of the data

	Descriptive Statistics								
	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Error Std. Error	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Std. Error Std. Error
Service Features are Significant in Operating Selection	205	1	5	3.61	.060	.865	.748	-.812	.170
New Schemes and Offers are fulfilling customers necessities	205	1	5	3.63	.065	.933	.871	-.707	.170
Service Rates are Moderate as per customers needs	205	1	5	3.60	.057	.809	.654	-.881	.170
Service Quality is Necessary to Enhance the Customer Loyalty	205	1	5	3.56	.062	.884	.782	-.687	.170
The quality of the customer support service would be a powerful reason in your choice to switch service provider	205	1	5	3.46	.062	.887	.787	-.877	.170
Complaint and Problem Resolution time is Speedy	205	1	5	3.65	.076	1.089	1.186	-.749	.170
Customer support service resolves the problems rapidly	205	1	5	3.44	.074	1.065	1.135	-.437	.170
Service quality of network meets in terms of reliability and responsiveness	205	1	5	3.23	.068	.978	.956	-.469	.170
Service quality is good enough to charge current cost	205	1	5	3.41	.077	1.106	1.224	-.461	.170
Valid N (listwise)	205								