PNG GOVERNMENT POSTGRADUATE COLLEGE, RAMNAGAR, NAINITAL, UTTARAKHAND, INDIA

अनुसंधान-2022

[*ANUSANDHAN*]

'A Compendium of Research Publications'

Compiled by Internal Quality Assurance Cell

Academic Year
2021-2022

Disclaimer

This compendium, 'Anusandhan-2022' is a collection of publications done by the students/researchers and faculty members associated with PNG Govt. Postgraduate College, Ramnagar, Nainital, Uttarakhand. This is meant for non-commercial internal circulation of research papers and information about other publications.

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IQAC is compiling and printing 'Anusandhan-2022' for the benefit of students, researchers and faculty members to encourage and promote research and collaboration culture in the college. It will also showcase our institution's research potential for excellence.

Message

I am immensely delighted to know that Government Postgraduate College, Ramnagar, (Nainital) is publishing a compendium of research papers published by their faculty members in different journals and books during the last few years. The innovative initiative would be conducive to create an ecosystem of research and publication among faculty members and students and thereby inspire them to come up with new ideas, transform them in research projects and share the research outcome, for wider use, with the policy maker and society through publication of research papers in reputed journals. What is most required is to enhance the volume of research without compromising the quality of research. The inculcation of values and ethics in undertaking research work and publication cannot be over-emphasized. We need to engage students in research activities for competence and capacity building and it is, therefore, that they should be suitably trained during the course of their studies, in order to make them future ready in analyzing the issues and exploring the appropriate solutions to bring fundamental and sustainable change in the quality of life. In view of ecological imbalances, research must help in striking a balance between development and conservation. The enhanced as well as appropriate use of technology could be a game changer in this respect.

I hope that the publication would showcase the research achievements of the institution and provide a meaningful niche to kick-start the further research activities and their time-bound reporting. It will also facilitate the evaluators and assessors of accreditation and ranking agencies with realistic collective evidences of research outcome and achievements. Besides, the proposed compendium   would also provide informed choices to researchers and partially reduced the possibilities of duplication of research and constant wastage of resources, time and efforts.

I offer my best wishes of the compendium.

[Prof. Chandra Datt Suntha]

Director

Message

The future of any institution depends on the knowledge creation efforts done today by investing time, energy and money. An academic institute, like ours, can immensely contribute in the future readiness of the society by creating knowledge through research and imparting it to the students through teachings.

It gives me immense pleasure to see the efforts made by our esteemed faculty members who have done a wonderful service to college, in particular, and society, in general by performing research in their respective subjects. They have taken task beyond their call of routine duty of teaching to conduct research and nurturing young talents to complete their PhD.

I am happy to know that our faculty members and research scholars could publish 11 Research papers in the journals of national and international repute and 02 text books. However, these publications shows that the true potential of PNG Government Postgraduate College, Ramnagar, is yet to fully utilized.

I hope that in the coming years when we shall be utilizing our full potentials of all the faculty members, many more high impact research will be conducted that would academically shape the future of this young state, Uttarakhand.

I extend my sincere thanks to the faculty members who published their researches in 2021-22 and hope that it would not only encourage them but also other faculty members to conduct more research and publish them in the coming academic year.

I would like to also thank the IQAC for compiling research publications.

[Prof. Mohan Chandra Pande]
Principal

Message

'An investment in knowledge pays the best interest'- Benjamin Franklin

Performance of an educational institute is a reflection of its internal quality. The stakeholders like faculty members are an integral part to uphold and assure quality of their teaching and knowledge creation through continuous research and innovation.

The main purpose of internal quality assurance cell is to promote quality in education and research through promotion of conducive and supportive work culture in the institute.

It is a matter of joy that our esteemed faculty members published 02 text books and 12 articles in journals of national and international repute. The *'Anusandhan-2022'* is a collection of publications by the faculty members during the academic year 2021-22. It shows a glimpse of our learned faculty members' untamed potential and I am sure that in the coming years more and more faculty members would be publishing high quality research and text books.

[Dr. Pramod Joshi]
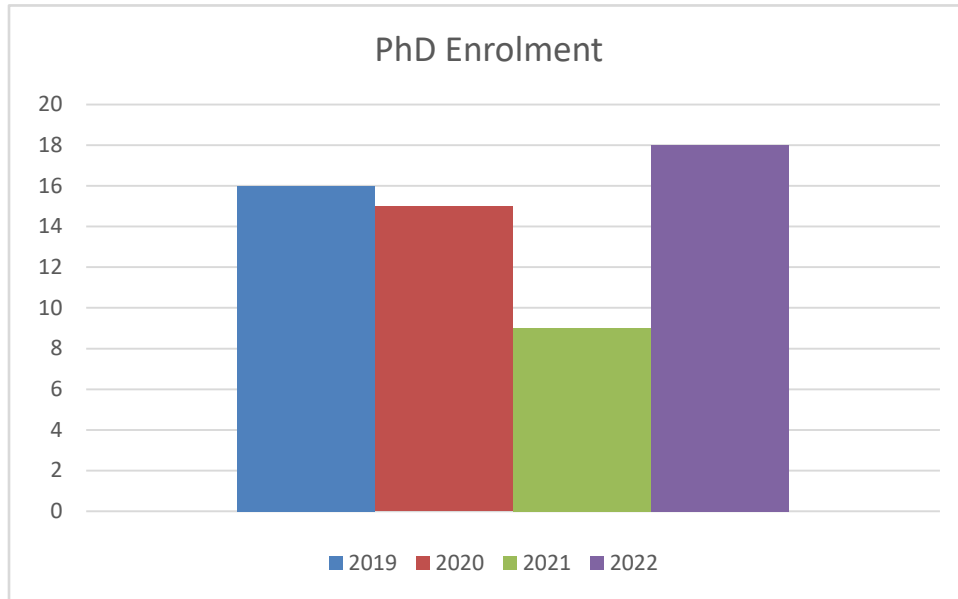Director / Coordinator, IQAC

IQAC 2021-22

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Research at a Glance

PhD Enrolment in the College

Department of Geography

Publications 2021-22

Dr. Anurag Srivastava

Dr. Anurag Srivastava, Assistant Professor and In-Charge

Dr. AnuragSrivastava earned his Bachelor& Master's degree from Allahabad University, Prayagraj, UP and Doctorate Degree from VBS Purvanchal University, Jaunpur. He has joined higher education department in 2003. His research interest is Rural Development.

The department have published following papers / chapters in edited book during 2021-22-

1. Problems and prospects of rural tourism in Nainital district of Uttarakhand.

PROBLEMS AND PROSPECTS OF RURAL TOURISM IN NAINITAL DISTRICT OF UTTARAKHAND.

Mr. Jitendra Kumar

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Abstract

In modern days tourism is emerged as one of the largest service-sector industry and generates national income as well as job opportunities especially for local population and become an avenue of economic and social development and cultural exchange. In recent times, the concept of 'Rural Tourism' has gained importance as a new part of tourism sector, which promotes Rural Livelihoods and Sustainability. It acts as a sustainable tool to counter the problems of Migration and Unemployment in rural areas. The present study is an attempt to examine the level of development of Rural Tourism in Nainital district, Uttarakhand. Currently, the rural economy is grappling with problems such as Unemployment, Low Income from Agriculture and other allied activities, extreme level of Migration and rural village evacuation. The tourism sector in Uttarakhand, is one of the key industries which contributes to the economic development of the state. It is estimated to contribute 2.96 per cent directly to the states gross value added (GVA) and 11.8 per cent to the state employment. In this context, the present study intends to examine the issues and challenges of Rural Tourism in Nainital district, Uttarakhand during 2022. The study is entirely based on primary data collected through stratified random sampling. The major findings of the research in the study area concludes that Rural Tourism provides the authentic experience to the tourist. Rural Tourism led to securing the Rural Livelihood by providing employment opportunities to local Rural Communities without establishment of additional huge infrastructure (Hotels, Resorts, etc). Rural Tourism development promotes the Sustainability of the fragile ecosystem. The study suggests that the concept of Homestay, as an alternative to the Mass Tourism should be promoted in the state.

Keywords: Rural Tourism, Unemployment, Migration, Rural Livelihood, Sustainable Tourism Development, Homestay.

Introduction

The word 'Tourism' has been originated from French word 'tourisme' which means movement of human beings from one place to another for leisure, holiday making or for various purposes. Several scholars have defined

tourism in their own words and the definition has also changed over years implying changes in scope and trend. In recent times, the concept of 'Rural Tourism' has gained importance as a new part of tourism sector, which promotes Rural Livelihoods and Sustainability. Today, contemporary rural societies are faced with numerous challenges. Many rural areas in Nainital district are facing dilemmas about their future existence due to the provoked economic changes of global scopes. Generally, the less-preferred and least-developed regions, which are dependent on natural resources and agriculture, are under heavy pressure. Hence, rural economy is facing the need for alternatives in overcoming many conditions such as low production, poor agricultural incomes, rural abandonment, unemployment, increase in poverty levels, as well as environmental pollution. Furthermore, many villages have suffered from extreme levels of emigration, often by the youngest and most active and reproductive groups, as well as females. This has particularly eroded the vitality of villages and rural communities. Therefore, Rural tourism is seen as a way out in providing additional financial input for rural peoples. Rural areas in Nainital district, especially the small villages, are considered extremely vulnerable in terms of social and economic issues. This study discusses the possibilities for introducing tourism as an alternative for sustainable rural economies in several selected villages, keeping in mind that their rural livelihoods possess capabilities, assets (both, material and social resources) as well as activities required for providing basic means of living in rural communities. Moreover, the study highlights that selected villages have preserved the natural environment, traditional ambience, local organic food and tranquillity and stress-free experiences. So, rural tourism may be encouraged for such rural areas in Nainital district of Uttarakhand. (Dimitrov & Petrevska, 2012; Dimitrov et al., 2019; Petrevska & Dimitrov, 2013; Petrevska et al., 2019).

Study Area

The state of Uttarakhand which is also known as "Abode of Gods", is one of the preferred tourist destinations across the globe. The state was formed as the 27th state on 9th of November 2000. There are two divisions of the state namely the Kumaun and the Garhwal region. The area on the right side of Kali River is known as "Kumaun" in local dialect. There are six districts in the Kumaun region namely Almora, Bageshwar, Champawat, Nainital, Pithoragarh and U.S. Nagar. Initially there were only two districts in the Kumaun region. Under the British rule Kumaun was divided into Kumaun and British Garhwal. Blessed with flora and fauna the Kumaun region is visited by tourist in large numbers throughout the year. There are many tourist destinations in the region that are world famous one of them is "Nainital" which is known as the lake district of India.

The Nainital district attracts large number of pilgrimage tourists through its historic Hindu temples such as Garjiya devi temple, Kainchi Dham mandir, Naina devi temple and many more. Many fairs and festivals held every year like the Kainchi mela, Harela parv (Bikhauti), Khatarua, Phool Dei, all these attracts large number of tourists to the region.

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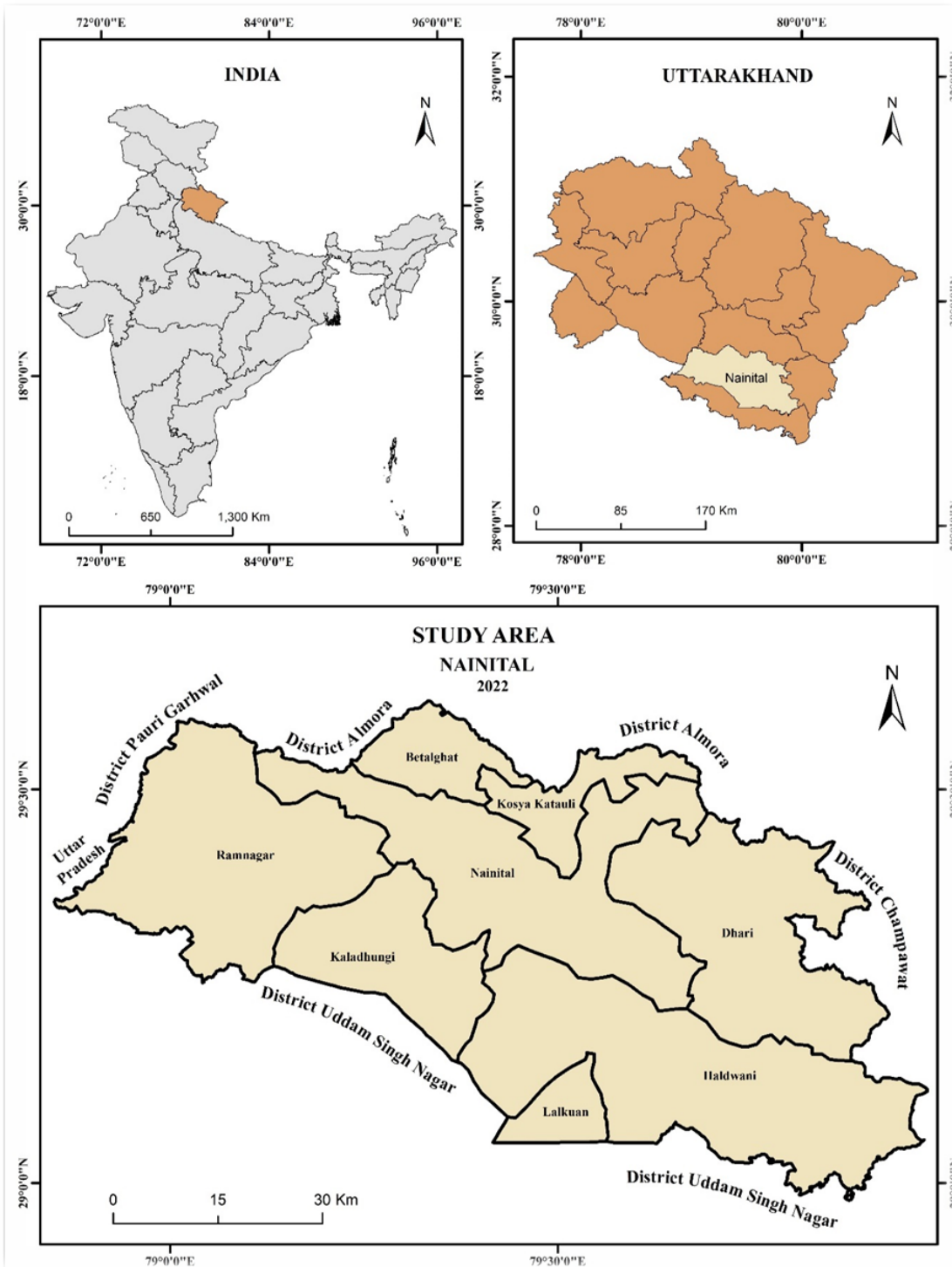
Map 1: Geo- referenced map of Study Area.

OBJECTIVES OF THE STUDY

The objectives of this research paper are two-fold, viz.;

- To examine the tourist perspective and major challenges faced in rural tourism.

- To identify the ground level reality of issues and challenges faced by local rural people in development of Rural Tourism.

- To identify the prospects of Rural Tourism development in the Nainital district.

DATA SOURCES AND METHODOLOGY

The present study intends to critically assess the issues and challenges of rural tourism in Nainital district, Uttarakhand. The study is based on primary data collected through multistage stratified random sampling. Field survey was conducted in 2022. A sample survey of 160 Respondents was conducted using well-structured interview schedule having both closed and open-ended questions. 20 Respondents from each Tehsil of Nainital district is taken, out of these 20 respondents, 10 from tourist and 10 from local rural people randomly. This study also uses secondary source of data from Books, research papers, websites, and government reports, etc. For the analysis purpose, the present study used simple tabulation, average, percentage and graphical methods.

Problems relating to Rural Tourism development in Nainital District

Level of awareness

It was observed that the level of awareness regarding the concept and development of Rural Tourism is poor among the rural people. They are unaware about the provisions and entitlements of about various government schemes for promotion of Homestay. It was examined that 53 Respondents (66.25%) were unaware about the current schemes for promotion and development of Rural Tourism.
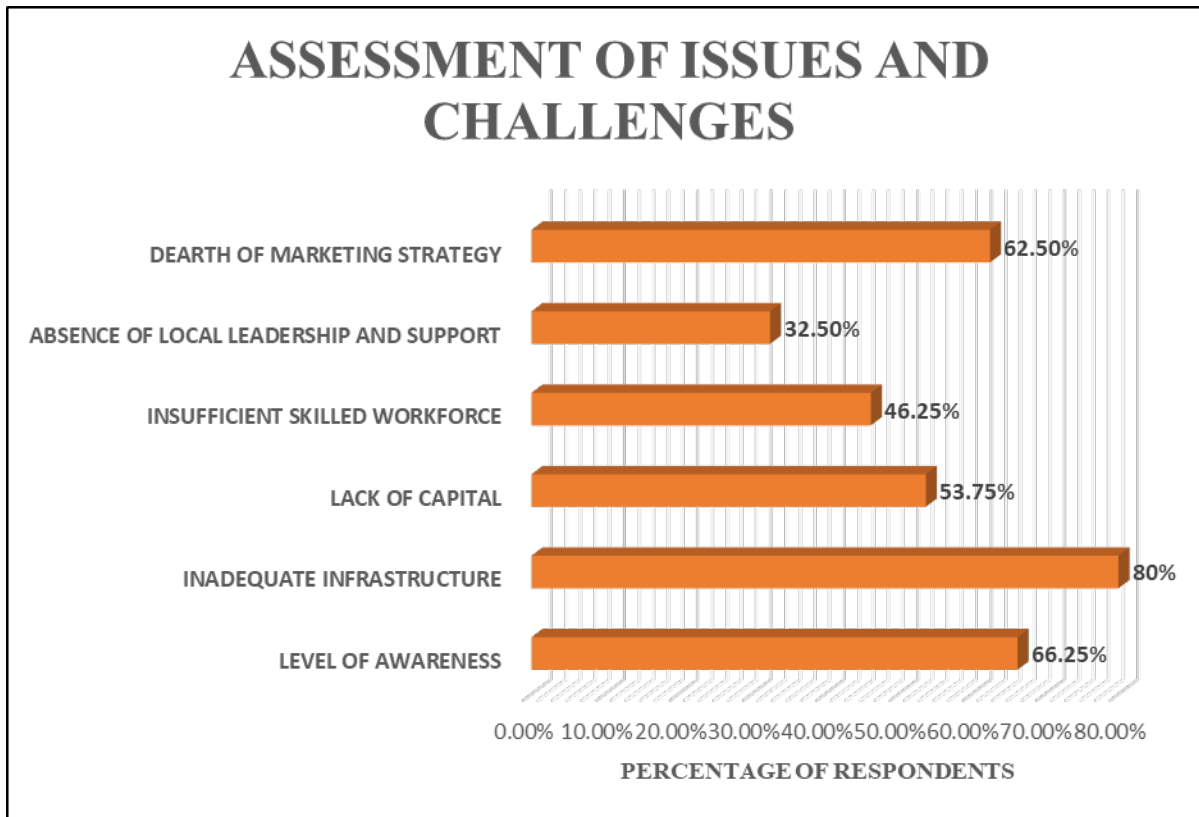
Source: Primary Survey, 2022.

Inadequate infrastructure

It was analyzed that the rural region is inadequate in terms of infrastructure development. Basic Amenities, Rural Road connectivity, Modes of Transportation, proper Accommodation, Network connectivity, etc. are missing in maximum parts of Nainital district. 64 Respondents (80%) stated that due to inadequate rural infrastructure development, tourist prefer major towns and cities of Nainital district.

Dearth of marketing strategy and management

It was observed that 50 Respondents (62.5%) claimed that there is dearth of marketing strategy, counselling, promotion, lack of associations and collaborations among rural people. Considering the success story of Sarmoli village in Munsiyari, local rural people had promoted rural Homestay on social media platforms. So proper counselling and promotion by the government is required at grass root level for development of Rural Tourism.

Lack of capital

It was noticed that 43 Respondents (53.75%) claim that they lack in capital for investment in Homestay. They face problem in raising the Marginal money for construction of infrastructure and development of Rural

Tourism. They are also scared of the Debt trap, if they take loan to raise Marginal money for construction of Homestay. The basic issue in this regard is the inability to raise Marginal money for Homestay and fear of Debt trap if they take loan from local money lenders.

Insufficient skilled workforce

Rural villages have suffered from extreme level of emigration, often by most active and reproductive groups, as well as females. This has particularly eroded the vitality of villages and rural communities. It was explored that 37 Respondents (46.25%) relatives migrated to towns and cities in search of employment and better education for children. They also face the challenge of stagnant agriculture produce and better living conditions. It was noticed that maximum migration is from hilly rural areas as compared to plain rural areas. So, it is concluded that the educated and skilled class of people migrate, which led to insufficient skilled workforce for development and management of Rural Tourism.

Absence of local leadership and support

The level of awareness and literacy among rural people is poor. Moreover, the local leaders and panchayat doesn't encourage and guide the rural people to take benefit of Homestay scheme. For individual, applying for homestay scheme and completion of documentation is tiresome, tedious and time taking. It was asserted by 26 Respondents (32.5%) that they didn't receive any support and guidance from panchayat or local leaders in application for Homestay.

Prospects for development of Rural Tourism in Nainital district

Rural Tourism focuses on the visitor actively participating in a rural lifestyle. Rural tourism may also include overnight stay in which the visitor also gets to know the unique lifestyle of the village at much closer quarters. Rural tourism is multi-faceted and entails Village tourism, Home stay tourism, Community based nature tourism and ecotourism, which are all closely aligned.

1. Eco-Tourism: Ecotourism can be defined as a type of tourism where the environment, local community and visitor all benefit. Ecotourism typically involves travel to destinations where flora, fauna, and cultural heritage are the primary attractions. One of the goals of ecotourism is to offer tourists insight into the impact of human beings on the environment, and to foster a greater appreciation of our natural habitats.

2. Village Tourism: Village Tourism, though a new concept in the Nainital district, introduced from the West is rapidly gaining in popularity owing to the fact that a huge bulk of our population still resides in the villages and to know 'India' in totality you have to know the Indian Villages first. That's the reason why the tourism department of the Government is making strong moves to foster Village tourism in the country. Jeolikot, Kaladhungi, K Village are few destinations in the Nainital district which have the potential in village tourism with their serene beauty.

3. Community Based Tourism: Community based tourism is a tourism form in which local residents invite tourists to visit their communities with the provision of overnight accommodation. Community based tourism enables the tourists to discover local habitats and wildlife, and celebrates and respects traditional cultures, rituals and wisdom. The community will be aware of the commercial and social value placed on their natural and cultural heritage through tourism, and this will foster community based conservation of these resources.

4. Home-stay Tourism: Homestay is the best way to experience the famed Himalayan hospitality of Uttarakhand. A Homestay is staying in someone's home as a paying guest for short time period where the guests are provided with budget friendly accommodation and services by individual family and the local community. People from Uttarakhand are simple and warm and follow the ancient Vedic tradition of 'Atithi Devo Bhava' or 'Guests are God' and they welcome their guests with open arms and offer personalized care and services. There are many registered Homestays available in this heavenly state of India where one explore rural locality full of splendid natural surroundings, enjoy local culture and cuisine, explore hidden spots; all this with the help of native people.

Conclusion

Strengthening rural development and rural livelihoods has been considered as one of the key drivers for change in the rural areas of Uttarakhand, particularly in the hill districts. The rural population depends largely on agriculture and labor for their livelihoods. Strengthening the rural economy of the state will be one of the key interventions for arresting the out-migration from these areas. The critical assessment of issues and challenges of Rural tourism in Nainital district, Uttarakhand had been done from the tourist perspective and local people perspective respectively. The major problems by tourists are the inadequate infrastructure, connectivity issues, lack of basic amenities, language barrier and security concern. For this the government need to focus on the development of infrastructure at grass root level to attract more tourist, which will boost the rural economy and prevent migration. All the problems of tourist are so interlinked to each other that a holistic and comprehensive approach need to be followed for development of Rural Tourism. The issues and challenges faced by the local rural people are level of awareness, infrastructure problems, lack of capital for investment, insufficient workforce and dearth of marketing strategy and lack of local leadership and support. The government need to promote these initiatives by workshops, counselling and awareness programs. There is need to development of state level associations of homestay and collaboration with different tourist activities to attract tourist. Promotion through internet, newspaper and campaigns. A strong relationship among the government, tourism industry, local community and academics can male difference in rural tourism. It is further concluded that the problem of migration should be addressed and employment in tourism sector should be promoted.

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Department of History

Publications 2021-22

Dr. Sharad Bhatt

Dr. Sharad Bhatt, Assistant Professor and In-Charge

Dr. Bhatt earned his Bachelor's degree from Kumaun University, Nainital. Master's and Doctorate Degree from Banaras Hindu University, Varanasi, UP. He has joined higher education department in 2001. His research interests is Indian intellectual tradition. He has published a paper during 2021-22.

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कुली–बेगार : आत्म स्वातंत्र्य का दमन

डॉ0 शरद भट्ट,
असिस्टेंट प्रोफेसर,
इतिहास विभाग,
राजकीय स्नातकोत्तर महाविद्यालय,
रामनगर, नैनीताल

प्रसिद्ध लेखक चार्ल्स डिकेंस के उपन्यास 'ग्रेट एक्सपेटेशन्स' में बच्चों की छोटी सी दुनिया का सजीव चित्रण है। इसमं एक पात्र 'पिप' कहता है कि 'अन्याय का एहसास बहुत अंदर तक होता है।[1] मैं समझता हूँ कि पिप ने जो कहा ठीक कहा। उसने बचपन में अपनी तुनकमिजाज व गुस्सैल बहन के हाथों बहुत अपमान सहा था। ऐसा ही अहसास अन्याय होने पर हर किसी को होता है और यह बात व्यापक पटल पर, चाहे अतीत में हो या वर्तमान में, हमारे संसार में जहाँ–तहाँ घर कर रहे अन्याय पर भी लागू होती है। 'निश्चित रूप से यह माना जा सकता है कि यदि परिहार्य अन्याय ने इन्हें उद्वेलित नहीं कर दिया होता तो पेरिसवासी कभी शाही कारागार पर आक्रमण नहीं करते, ना ही गाँधी जी इस साम्राज्य को चुनौती देते जिसमें कभी सूर्यास्त नहीं होता। ये सभी स्पष्ट रूप से दिखाई पड़ रहे अन्याय का यथासम्भव निराकरण अवश्य करना चाहते थे।[2] और ऐसी एक अन्यायपूर्ण, ब्रिटिश कालीन उत्तराखण्ड में प्रचलित 'कुली बेगार' के उत्पीड़क स्वरूप से मेरा यह शोध पत्र संबंधित है जिसे कि 'दासता', 'अर्द्धदासता', 'बंधुआ मजदूरी', 'मानहानि का प्रश्न', 'कुली कलंक', 'नियमबद्ध गुलामी', 'गुलामी का पट्टा', 'निंदनीय' आदि कितने ही संबोधनों से वयक्त किया गया और ये सभी संबोधन बताते है कि लोगों की दृष्टि में कुली–बेगार कितनी घृणित व अमानवीय थो।[3] इस कुप्रथा में निहित अन्याय ने ही 20वीं सदी में स्थानीय निवासियों को इसकी समाप्ति हेतु संगठित व आंदोलित किया।

II

बेगार का सामान्य अभिप्राय मजदूरी रहित जबरन श्रम से है। उत्तराखण्ड में इसका अभिप्राय मजदूरी रहित या अल्प मजदूरी सहित जबरन कराया गया श्रम और जबरन सामग्री लिए जाने की प्रक्रिया से है।[4] यह सत्य है कि किसी न किसी रूप में बेगार प्रथा प्राक् ब्रिटिश कालीन उत्तराखण्ड की शासन व्यवस्थाओं में प्रचलन में रहा, तथापि 1815 ई0 से उत्तराखण्ड पर काबिज ब्रिटिश सत्ता ने इसे नियमित शोषण का रूप देकर न केवल और क्रूर बनाया, बल्कि काश्तकारी बंदोबस्ती इकरारनामों में मनमानी धाराएँ डालकर इसे लिखित प्रमाणिकता भी दी।[5] ब्रिटिश उत्तराखण्ड में सामान्यतः कुली–बेगार नाम से संबोधित की जाने वाली बेगार प्रथा के तीन संघटक थे– कुली बेगार, कुली उतार व कुली बर्दायश।

कुली बेगारः इसका स्पष्ट अभिप्राय बिना मजदूरी के श्रम से था। औपनिवेशिक राज सत्ता के पहाड़ में विस्तार व सुदृढ़ीकरण के परिणामस्वरूप बड़े पैमाने पर किये गये निर्माण कार्यों, बड़े साहबों, सैलानियों, शिकारियों, सैनिकों, सर्वे दलों की यात्राओं के अतिरिक्त प्रशासनिक

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अमले के मध्यम व छोटे कर्मचारियों यथा तहसीलदार, पटवारी, रेंजर, गार्ड व चपरासी के लिए भी बेगार ली जाती थी।

कुली उतारः कुली उतार सरकारी या गैर सरकारी बोझों के ढुलान हेतु जबरन मजदूरी (न्यूनतम) सहित बुलाहट का नाम था। यह पहाड़ के काश्तकारों को बंदोबस्ती इकरारनामों की धाराओं के अनुसार साहबों, सैलानियों या सैनिकों के बोझ ढुलान या अन्य सरकारी कामों के लिए देनी पड़ती थी। उतार के दौरान – 'कृषि मौसम, काश्तकारों की व्यस्तता, बर्फ या गरमी का ध्यान कमी नहीं रखा जाता था और यह तथ्य भी भुलादिया जाता था कि कुली वृद्ध या स्त्रो है।[6]

कुली बर्दायशः इसका अभिप्राय विभिन्न पड़ावों में साहबों, सैनिकों और सैलानियों या उनके दलों को दी जाने वाली सामग्री से था। इसके अंतर्गत अनाज, सब्जी, घी, दूध, दही, मुरगी, अंडे, बकरी, पानी, लकड़ी, घास, बव्रन, नमक, मसाला, चीनी, तेल, चटाई आदि लिया जाता था। उतार व बेगार की तरह बदार्यश देने के लिए भी स्थानीय काश्तकार–बंदोबस्ती इकरारनामों के अनुसार बाध्य थे।[7]

पर 'बेगार' सिर्फ औपनिवेशिक राज की आर्थिक–प्रशासनिक नीति व सहूलियत का हिस्सा भी नहीं था, वरन यह मनुष्य की आत्मगरिमा और प्राकृतिक न्याय का सीधा उल्लंघन था, क्योंकि प्रचलित ब्रिटिश भू बंदोबस्त–जिसके अंतर्गत प्रत्येक भू–स्वामी के लिए कुली देना अनिवार्य था, ने उत्तराखण्ड की जनसंख्या के 80–90% हिस्से को जिसके कि पास थोड़ी–बहुत भी जमीन थी, कुली के रूप में बदल दिया और बेगार देने के लिये अभिशप्त कर दिया। शेष बचा हिस्सा भी अप्रत्यक्ष रूप से बेगार देने के लिए बाध्य था।[8] कुली शब्द का प्रयोग द0अफ्रीका की तरह तिरस्कार पूर्ण था। कुलियों के साथ औपनिवेशिक प्रभुओं का बर्ताव दोयम दर्जे के नागरिक मानने से कही अधिक अमानवीय और आपत्तिजनक होता था। कुलियों को लात मारा जाना या उन पर गोली दाग देने या स्त्री कुलियों के साथ दुर्व्यवहार के उदाहरण ब्रिटिश उत्तराखण्ड के इतिहास में प्रत्यक्ष होते हैं। बर्दायश के तहत स्थानीय लोगों से अपमानजनक व्यवहार व ज्यादती की जाती थी।[9] बर्तानकी शासकों के काश्तकारों को कुली के रूप में बाध्य व प्रयुक्त किये जाने के दृष्टिकोण ने इनके प्रति तिरस्कार और दुर्व्यवहारों को बढ़ावा मिला। 1859 में बर्तानवी हाउस आॅफ कामंस की सलेक्ट कमेटी ने स्वीकारा कि 'बेगार कण्टकारी, अपमानजनक है व इसने मध्यवर्ती शक्तियों को जनता पर जुल्म ढाने का मौका दिया।[10]

विशेषकर ब्रिटिश प्रशासन के मध्यम व निचले स्तर के कर्मचारियों जैसे–पटवारी, तहसीलदार, चपरासी, लिपिक, फारेस्ट गार्ड आदि द्वारा कुली प्रथा के तहत काश्तकारों के प्रति अपमान जनक व्यवहार, शोषण के सैकड़ों उदाहरण इतिहास में प्रत्यक्ष होते है।[11] औपनिवेशिक राज के क्रियाकलापों, नवविभागों के सृजन व विभागों के विस्तार के परिणाम स्वरूप औपनिवेशिक प्रभुओं के लाव लश्कर सहित पहाड़ में एक स्थान स दूसरे स्थानों के लिये होने वाले दौरों / यात्राओं में हुई अभूतपूर्व वृद्धि ने, कुली–बेगार के लिये लोगों की जरूरत को भी बढावा दिया, जिसके कारण काश्तकारों के लिये, इनका कुली के रूप में बाह्य प्रयोग व दुर्व्यवहार उनके दैनिक जीवन का हिस्सा सा बन गया था।[12] चूंकि इससे कोई भी जाति / वर्ण अछूता न था, इसलिये यह अपमान सामूहिक अपमान था। इस प्रथा के असह्य परिणामों की बानगो इसके विरूद्ध उठी आवाजों में स्पष्ट जो न केवल स्थानोय पत्रों में लेखों के रूप में ढली बल्कि स्थानीय कविताओं / काव्यों में मुखरित हुई।[13]

III

यद्यपि उपनिवेशवाद / सामाज्यिक प्रभुत्व अधीनस्थ लोगों पर पूर्ण नियंत्रण की कामना से भरा होता है और इसलिए अधीनस्थ की दासता उपनिवेशवाद का सामान्य व्यवहार है,[14] किंतु उत्तराखण्ड में बर्तानवी शासन के प्रति नजरिया एक लंबे समय तक आदर से भरा हुआ था। उन्होंने स्थानीय लोगों को गोरखों के अमानवीय, बर्बर, सामंती–सैनिक नियंत्रण से मुक्ति दी थी।[15] विशेष रूप से गोरखाकाल में प्रचलित मनुष्यों की बिक्री के अमानवीय व्यापार को प्रतिबंधित कर। उन्होंने प्रगतिशील, न्यायिक व उदारवादी शासन की छवि प्रस्तुत

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की। गोरखाकालीन सैनिक आतंक, सामंती करों व अनेकानेक कुप्रथाओं से ब्रिटिश शासन में मुक्त स्थानीय जनता ने ब्रिटिश पैतृक निरंकुशतावादी शासन के प्रति अपना समर्थन दिया।[16] तथापि जिन तर्कों, न्याय की मूल अवधारणा के आधार पर ब्रिटिश द्वारा मानव विक्रय, दास प्रथा को प्रतिबंधित किया गया था[3] इनके आधार पर बेगार को प्रतिबंधित करने का ब्रिटिश ने विचार तक नहीं किया। इसके उलट, अर्द्धदासता के गुणों से भरी मध्यकालीन प्रथा बेगार को, आर्थिक व प्रशासनिक सुविधाओं हेतु नियमित करने, संस्थागत रूप देने में उन्हें कोई संकोच नहीं था। यही नहीं इस प्रथा को पुराना और प्रचलित बताकर, कृषकों के हित में बताकर इसका बचाव किया गया।[17] चाय बागानों के यूरोपीय मालिकों को बेगार से मुक्त रख, ब्रिटिश को प्रजातीय भदभाव के सार्वजनिक प्रदर्शन से भी कोई ऐतराज नहीं था।[18]

पाश्चात्य श्रेष्ठ सभ्यता मूल्यों व आदर्शों के प्रतिनिधि के रूप में आत्म संतुष्टि से भरे ब्रिटिश राज–प्रशासन के लिये कुली बेगार के तहत इच्छा के विरुद्ध बोझ ले जाने हेतु विवश करना, संभवतः न्यायपूर्ण व्यवहार व स्वीकार्य विधिक कर्तव्यों के अंतर्गत स्वीकृत था, किंतु यह न्याय के शाश्वत नियम जो कि नैतिक सदाशयता के प्रतिनिधि होते है, जिनमें आधारभूत स्वतंत्रताओं की महत्ता की स्थापना होती है, के स्पष्ट विरुद्ध था।[19] क्योंकि न्याय के नियम मानवीय जीवन की गुणवत्ता व सर्वर्द्धन हेतु उत्पीड़न से स्वतंत्रता के महत्व को न केवल स्थापित करते है, बल्कि उसे कानून के शासन(Rule of Law) या सभ्य/न्यायी समाज(Orderly Society) को स्थायी पहचान भी बनाते है। इसीलिये स्वयं इलाहाबाद उच्च नयायालय ने ब्रिटिश सरकार प्रशासन के विरुद्ध 15 अप्रैल 1904 को निर्णय दिया कि ग्रामीण काश्तकार उतार या बर्दायश या बनियाँ नाली देने से इंकार कर सकते थे, और यदि ऐसा करने पर तहसीलदार या हाकिम उन्हें बुलाये तो वे इससे भी इंकार कर सकते थे।[20]

IV

यूँ तो बेगार के सामाजिक–आर्थिक निहितार्थ कष्टकारी थे,[21] पर उससे कहीं अधिक पीड़ादायक था उसके मनुष्य की चेतना पर पड़ने वाला मनोवैज्ञानिक प्रभाव। इसने भू–स्वामियों/काश्तकारों को बोझा उठाने वाले 'कुली' के रूप में पहचान देकर, उनके आत्मसम्मान को क्षतिग्रस्त कर दिया। अगर यह प्रथा स्वैच्छिक, आर्थिक–गतिविधि के एक प्रकार के रूप में प्रचलित की जाती तो इस प्रथा से स्थानीय लोगों को कोई आपत्ति नहीं थी। जैसा कि 'खुशकुली'(स्वेच्छा से कुली का काम) या स्थायी कुलियों की नियुक्ति या गढ़वाल में कुली एजेंसी के द्वारा कुलियों की आपूर्ति पक्ष में स्थानीय जनता व नेतृत्व की सहमति व समर्थन से व्यक्त।[22] किंतु बाध्यकारी इस प्रथा के तहत से कुली में बदल दिया जाना वस्तुतः व्यक्ति के स्वयं में विश्वास/आत्मसम्मान को क्षीण कर, अंततः शासक के अधीन विजित की अधीनस्थ दास स्थिति को सदैव के लिये नियत कर देता है।[23] विशेषतः इसने उच्च जाति के स्वर्णों के आत्मगौरव व सामाजिक प्रतिष्ठा का क्रूरतापूर्ण पद दलन किया। सामाजिक सांस्कृतिक–आर्थिक हैसियत में विशिष्ट अधिकार व सम्मान प्राप्त इस वर्ग के लिये 'कुली' के रूप में स्वयं को सोचना व काम करना, आत्म सम्मान के खत्म होने जैसा था। इसलिये बेगार के विरुद्ध सर्वाधिक उग्र प्रतिक्रिया व मुखर विरोध भी इसी वर्ग से आया। बदरीदत्त जोशी कुली बेगार को हमारे प्रांत के उच्च श्रेणी के लोगों के आत्मसम्मान की जड़ पर कुठाराघात के रूप में देख रहे थे,[24] तो हरगोविंद पंत के लिये यह प्रथा घृणित व अपमानजनक थी। मानमार्यादा पर एक कलंक थी।[25]

V

वस्तुतः 'स्वचेतना' को क्षतिग्रस्त करने वालें बेगार के दुष्प्रभावों की समझ उत्तराखण्ड में शिक्षा व राष्ट्रवादी चेतना की व्यापकता के साथ गहन होती चली गयी। शिक्षा के प्रसार, सांस्कृतिक बौद्धिक संगठनों के विस्तार, पत्र–पत्रिकाओं के विस्तार, पत्र–पत्रिकाओं के विस्तार, राजनीतिक चेतना के प्रसार, विशेष रूप से शिक्षित मध्यवर्ग के विकास ने बेगार के पीड़ादायक अन्यायी पहलुओं के प्रति 20वीं शती के प्रथम दशक से गंभीर चिंता व्यक्त करना आरम्भ कर दिया। 20वीं शती के दूसरे दशक विशेषतः 1913 के बाद जब बेगार प्रथा के

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'अल्मोड़ा' में लागू किये जान की घोषणा की गयी, बेगार के प्रति विरोध के स्वर तीखे व संगठित होते चल गये। सी0वाई0 चिंतामणि के शब्दों में 'अगर ब्रिटिश सरकार जानवरों के विरुद्ध क्रूरता के लिये इतनी संवेदनशील है कि इसे रोकने के लिये कानून पास करती है, किंतु बेगार के तहत आदमियों के साथ क्रूरता को रोकने के लिये कानून की जरूरत क्यों नहीं महसूस करती।[26] बेगार जैसी न्याय से असंगत प्रथा का औपनिवेशिक प्रशासन द्वारा जारी रखना स्वयं ब्रिटिश के मुक्तिदायी स्वरूप पर प्रश्न चिह्न लगा रहा था। वहीं दूसरी ओर स्वराज की बढ़ती चेतना ने बेगार विरोधी निर्णायक मानसिकता को रचने में योगदान दिया। स्वराज मानव जीवन की गुणवत्ता व संवर्द्धन से जुड़ा था, केवल राजनैतिक शासन व्यवस्था का ही रूप नहीं वरन यह एक मनोवृत्ति, भावना, मानसिकता थी और इसीलिये न्याय की मूल भावना से भी जुड़ा था। गाँधी जी के शब्दों में—यह मनुष्य के आत्म का उस प्रतिरोधी चेतना से समर्थ होना था जो शक्ति के दुरूपयोग का प्रतिकार करती थी।

अतः बेगार जो कि मनुष्य के स्वतंत्र आत्म का क्षरण करता है, आत्म सम्मान को नष्ट करता है, जो स्वयं दासता का ही एक रूप है अपने स्वरूप में ही स्वराज की मूलभावना के विरुद्ध था और इसीलिये बेगार के विरुद्ध राष्ट्रवादी मत असंदिग्ध व निर्णायक थे— 'कुली देना नहीं होता।'

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15		मेरी अम्मा (दादी) स्व0 श्रीमती रेवती भट्ट जिसने 1942 में अपने गाँव 'सालम' को छोड़कर मेरे दादा स्व0 श्री भवानी दत्त भट्ट के साथ जंगलों में पनाह ली क्योंकि गाँव में अफवाह फैली थी कि 'गोरखे' आ गये हैं। मेरी अम्मा कहती थी कि लोगों को अंग्रेजों का नहीं, वरन 'गोरखों' से भय होता था।
16		विशेष रूप से कुमाऊँ कमिश्नर रैमजे के शासनकाल तक ब्रिटिश शासन के प्रति अरूचि या विरोध की व्यापक अभिव्यक्ति दृष्टिगत नहीं होती।
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1. Impact of drug addiction on anxiety level.
2. The Impact of Gender and Marriage Type upon Marital Adjustment.
3. Role of gender and residing area on locus of control of college students.

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02

Impact of Drug Addiction on Anxiety Level

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ABSTRACT :

Substance addiction, also called substance use disorder, is a disease that affect a person's mental health and behavior. Addiction is a condition where a person is physically, emotionally and psychologically dependent on drugs for their normal functioning. The World Health Organization expert committee has defined drug addiction as "a state of periodic or chronic addiction, harmful to the individual and society. This study aimsto find out the impact of drug addiction upon anxiety among youth.The total sample comprised of 80 respondents between the age group of 20 to 40 years. The sample was selected with the help of randomized sampling technique from Nainital district of Uttarakhand. Out of 80, 40 youth were from the non-addicted category and 40 were from the drug-addicted category. For the collection of data "Anxiety, Depression and Stress Scale" constructed and validated byBhatnagar P., Singh M., Pandey M., Sandhya and Amitabh was used.In the study, it was found that a significant difference in the anxiety level was observed between drug- addicted and non-addicted youth. As per the result,Drugaddicted youth have shown low level of anxiety than non-addicted youth.

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Key Words: Drug, Anxiety, Mental Health, Addiction

Introduction :

Substance addiction, also called substance use disorder, is a disease that affect a person's mental health and behavior. Substances such as alcohol, marijuana, and nicotine are also considered drugs. When individuals become addicted to these drugs, they can continue to use the drug despite the harm caused by it. Addiction is a condition where a person is physically, emotionally and psychologically dependent on drugs for their normal functioning. The World Health Organization expert committee has defined drug addiction as "a state of periodic or chronic addiction, harmful to the individual and society, resulting from repeated use of a drug made by natural or chemical synthesis." Repeated drug use can cause changes in the brain that can affect a drug addict's self-control and ability to resist cravings. According to Csiernik R. (2016) addiction is a chronic, recurrent brain disease characterized by repeated and increased use of a substance, a deficiency of which leads to symptoms of distress and to re-use of the agent. There is a unique urge for physical and mental deterioration.

Anxiety-Anxiety is a normal and often healthy emotion. It is a natural response of a person's body to stress. It is a feeling of fear or apprehension about what is to come. However, when a person experiences disproportionate levels of anxiety on a regular basis, it becomes a medical disorder. Anxiety affects everyone in different ways. Sometimes, feelings of fear and dread do not go away or get worse over time.

H.S. Sullivan (1953) Anxiety is the state of tension arising from the experience of disapproval in interpersonal relation.

Several types of anxiety disorders-Agoraphobia, Anxiety disorder due to a medical condition, generalized anxiety disorder, Panic disorder, Separation anxiety disorder,Social-anxiety disorder, Specific phobias, Substance - induced anxiety disorder.

Anxiety and Drug addiction- According to the Anxiety and Depression Association of America, social anxiety disorder "frequently travels in the company" of alcohol or drug abuse, as people with social anxiety disorder might try to make use of these substances to help them feel more comfortable and less inhibited in social settings(Leah W.2022).People who experience symptoms of anxiety often turn to drugs to calm themselves, or to help them relax or fall asleep. Self-medicating for anxiety is risky, as it is only a temporary solution, as the anxiety returns when the medication stops. In addition, brain receptors adapt to the presence of drugs. Over time, a calm state canonly be reached by activating these receptors with drugs. Tolerance also develops, and the person will need increasing amounts of drugs and alcohol to relieve the symptoms of anxiety.

Review of Literature: Many researchers have tried to study the Anxiety level of non-addicted and drug addicted youth.

According to the study conducted by **Fooladi N., Jirdehi R. and Amiri Z.M.(2014)** conducted a study comparison of depression, anxiety, stress and quality of life in drug abusers with normal subjects. The result show that in comparison with normal individual, opiates addicted were found significantly higher in depression, anxiety and stress. The quality of life of ordinary people was also significantly higher than those addicted to opiates. Depression, anxiety and stress were found to be negatively correlated with quality of life.

Ghoreishizadeh and Torabi (2002), an extensive part of narcotics substance abusers aged 25-34 years in which 80% of them use narcotics. The most common disorders in axis I are depression (67%) and anxiety disorder (36%) while the most common disorder in axis II is antisocial disorder (41%). Psychological pathology is one of the common outcomes in drug addiction and has an important role in etiology, prognosis

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and treatment of drug dependency.

Mohamed, Ahmad and Hassan (2020) aim to investigate the Assessment of anxiety and depression among substance use disorder patients: a case-control study. The results revealed thata significant difference exists between drug addicted and non-addicted youth anxiety level. Substance use disorders are associated with high levels of anxiety. Drug addicted youth have shown high level of anxiety than the non-addicted youth.

Satyaprakesh and Arya A.(2018) conducted Comparative study on depression & anxiety status of addict &Non-addictinapex de-addiction & rehabilitation centre, Uttarakhand. The results revealed thata significant difference was found between addicted and non-addicted people anxiety level. Addicted people have shown high level of anxiety than the non-addicted people of Uttarakhand. The research concluded that the non-addict who have freer & less faltered mind are more relaxed, focused, happy and patient than the addicts who are not stable physiologically which in turn affects their psyche.

Wani MA* and Sankar R (2016) conducted a study on impact of drug addiction on mental health. The results revealed that age and gender have significant effect on mental health of drug addicts. Also adults and female addicts show better mental health than adolescents and male addicts.

Windarwati H.D &Megananda N.K. (2021) conducted a study stress, anxiety, and depression with potential drug abuse in adolescents: Cross-sectional study. The result indicates that 624 adolescents (74.2%) showed potential drug abuse, while the remaining 217 adolescents (25.8%) did not show potential drug use. Most of the participants (51.4%) were male, in which 357 adolescents (42.4%) experienced stress, 603 adolescents (71.6%) experienced anxiety, and 591 adolescents (70.4%) experienced depression. The potential drug abuse in adolescents was not significantly related to stress (p-value 0.06), anxiety (p-value 0.82), and depression (p-value 0.650). Mental health problems (stress, anxiety, and depression) were not related to drug abuse among adolescents.

OBJECTIVE OF THE STUDY:Following objective had been framed for the Study -.

· To find out the impact of drug addiction upon anxiety level of youth.

HYPOTHESES OF THE STUDY: Following Hypothesis had been framed for the Study -.

· There would be no-significant difference in the anxiety level of drug-addictedand non-addicted youth.

METHODOLOGY:

RESEARCH DESIGN: The design of the study wasdescriptive and comparative. The sample and tools measuring the anxiety level chosen according to the research objectives have been presented in the following sections.

Sample: The total sample comprised of 80 respondents between the age group of 20 to 40 years. The sample was selected with the help of randomized sampling technique from Nainital district of Uttarakhand. Out of 80, 40 subjects were from the non-addicted category and 40 were from the drug-addicted category. Non-Addicted sample was selected from the students studying in colleges and working (office/business located in Nainital district), and the drug addicted sample was selected from the drug Addicts, undergoing treatment at many Drugs de-addiction center located in Nainital district.

Tools used: The data was collected with the help of "Anxiety, Depression and Stress Scale" constructed and validated byBhatnager P., Singh M., Pandey M., Sandhya and Amitabh. The scale has total 48 items.The 48 items were divided into 3 subscales"Anxiety, Depression and Stress." For the scoring ofscale, each item was scored 1 if endorsed "Yes" and 0 if endorsed "No". Reliability of the total scale in terms of internal consistency as measured by Cronbach s Alpha and Spearman-Brown coefficient is 0.81

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and 0.89. The obtained reliability for anxiety, depression and stress subscales as measured by SpearmanBrown coefficient is 0.86, 0.86 and 0.76 respectively. Justification of the tool used is that it can be easily administered on the old-aged people through interview and the data regarding anxiety, depression and stress can be obtained together. Number of the test items is also moderate for measuring anxiety, depression and stress. The reliability of the scale is also high.

Statistical Treatment : After collection of data ,Mean and One-Way ANOVA test have been used to test the significance of means of the groups.

RESULTS: Findings have been summarized in the table-1. Table shows theF-value of impact of drug addiction upon anxiety of youth.

	df	Sum of Squares	Mean Square	F
Between Groups	1	94.61	94.61	6.47 P>.01
Within Groups	78	1139.87	14.61	
Total	79	1234.48		

Table-1

It is evident from table -1 that (i) The difference between drug addictedand non-addicted youth anxiety level was found significant even at 0.01 level of confidence, (F=6.47, P>.01). The hypothesis states that there would be no significant difference in the anxiety levelbetween drug- addictedand non-addicted youth stands rejected.Drug addicted youth have shown high level of anxiety than thenon-addicted youth.

Table -2 showing the mean and S.D. values of drugs addiction and non-addiction youth anxiety level.

	N	Mean	Std. Deviation
Non Addict	40	4.67	3.82
Drug	40	6.85	3.81
Total	80	5.76	3.95

Table-2

Diagram -1 showingthe mean and S.D. values of drugs addiction and non-addiction youth anxiety level –
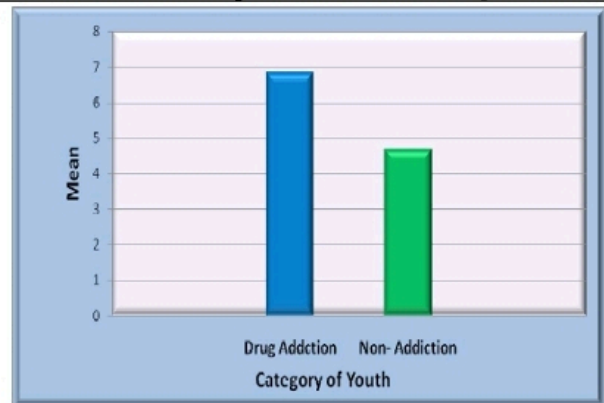
Diagram- 1

DISCUSSION:

Different types of drugs can have different side effects and effects on a person's mental health as they affect the body in different ways and every person is different from each other physically and mentally. It is difficult to predict how a person will react to a specific drug. The drugs interfere with chemicals in the brain and can affect brain messaging and function.

This can have an effect on mood contributing to the onset or worsening of mental health issues. Drug use can also cause changes in some of the areas of the brain that are associated with other mental health conditions, such as schizophrenia, anxiety, mood, or impulse-control. In our study, the impact of drug addiction upon anxiety level of youth found significant. Both groups have shown different level of anxiety. In the study,drug-addicted youth have shown high level of anxiety than the non-addicted youth. Our results are in accordance with the findings of **Mohamed, Ahmad and Hassan (2020)** aims to investigate the Assessment of anxiety and depression among the patients of substance use disorder: a case-control study. The results revealed thata significant difference between drugs addicted and non-addicted youth anxiety level. Substance use disorders are associated with high levels of anxiety. Drug-addicted youth have shown high-level anxiety than the non-addicted youth.

Satyaprakesh and Arya A. (2018)

conducted a study to Comparative study on depression & anxiety status of addict &Non-addictinapex de-addiction & rehabilitation centre, Uttarakhand. The results revealed significant difference inanxiety levels between addicted and non-addicted youth, whereAddicted people have shown high level of anxiety than non-addicted youth of Uttarakhand.

CONCLUSION:

Thus, it can be concluded from the above discussion that-

➢ There is a significant difference in the anxiety level of drug-addictedand non-addicted youth. Drug addicted youth have shown high-level anxiety than the non-addicted youth.

Limitations& Suggestion: The present Study has covered only Drug addiction as a variable. Other variables such as gender, age, family background, socio-economic status, residential area canbe covered in future studies.

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The Impact of Gender and Marriage Type upon Marital Adjustment

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ABSTRACT

Marital Adjustment is a state in which there is an overall feelingof happiness and satisfactionbetween couples in their marriage. It not only binds man and woman as husband and wife, but different families also gets joined. The present study aimed to assess the nature of marital adjustment among couples. It also aimed to check marital adjustment with reference to gender and type of marriage. The sample constituted of total 60 couples out of which 30 were males (15 love marriages and 15 arranged marriages) and 30were females (15 love marriages and 15 arranged marriages). The data was collected from Almora District of Uttarakhand. For the collection of marital adjustment data "Marital Adjustment Questionnaire" (2018) constructed by Pramod Kumar (Retd.) and Kanchana Rahotgi has been used. The data was scored, analyzed as per the manual. T-testwas being calculated. Results revealed significant impact of gender upon marital adjustment in couples. Male couples have shown the higher level of marital adjustment than female couples. No significant impact of types of marriage was found upon marital adjustment of couples. Both the groups have shown almost equal levels of marital adjustment.

Key Words: Marriage, Love, Arrange and Adjustment.

INTRODUCTION

Marriage is a big step in life. It is the base of a family and it is the foundation of a healthy society. It is one of the strongest human relationships and social contact which permits legal union between two individuals termed as spouse. Marriage, also called matrimony or wedlock, is a culturally and often legally recognized union between people called spouses. It establishes rights and obligations between them, their children, and their in laws. It is considered a universal cultural, but the definition of marriage varies between cultures and religions, and over time. Basically, it is an institution in which interpersonal relationships, usually sexual relation, are acknowledged or sanctioned. In some cultures, marriage is recommended or considered to be compulsory before pursuing any sexual activity. A marriage ceremony is called a wedding institution. "A successful marriage becomes union of personalities. Each one brings to the partnership qualities that enrich the life of the other as well his or her own. Both experience some enhancement of personality, for they benefit from each other attribute and capacities" (Landis and Landis: 1948).

Aim of a Marriage: In human society marriage aims to regulate sexual activity, procreation and providing social status to children, building a family and to attain financial assistance.

Types of Marriage - According to the scripture, there are eight types of marriages. These are the Brahma, Daiva, Arya, Prajapatya, Asura, Gandharva, Rakshasa and Vampire. But in Indian setting, marriage is most commonly classified into two parts - love marriage and arranged marriage.

Love Marriage: In love marriage, mutual attraction and love is the basic foundation of marriage. Before marriage, couples know each other; they have intimate relationship, long courtship and experience of love. The couple may develop an emotional involvement or they find that they are compatible and enjoy each other's company and so finally they decide to marry, with or without consent of parents.Rao and Rao, (1982) studies conducted on love marriages show that lovers, who got married with the consent of their parents, have changed considerably.

Arranged Marriage: In arranged marriage, the partner is selected by third party, particularly by parents, relatives or friends. Before marriage both husband and wife are unknown to each other and even if they know each other there is no love and emotional bond developed among them. Arranged marriages are based on trust and understanding rather than love at first sight. Commitment is the strongest point in arranged marriages which brings two people together and love gradually blossoms.

Marital Adjustment: Marital Adjustment is a state in which there is an overall feelingof happiness and satisfactionbetween husband and wife in their marriage. It not only binds man and woman as husband and wife, but

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different families are also joined. After marriage a new family is formed. The responsibility of running this new family is equally important for husband and wife. Marital adjustment is an acceptance between the couple to the extent where there is presence of companionship between the two on account of affection and intimacy and also accommodation which the couple provides each other (Lock and William, 1959). Vincent (1981) feels that the goal of marital adjustment is self - fulfillment for both partners together without sacrificing the individual self - fulfillment of either.

REVIEW OF LITERATURE

Studies related to the effect of gender and types of marriage upon marital adjustment of couples-

JarsaniyaJayendra (2021)aimed at exploring the emotional intelligence and marital adjustment in married couple's relation to gender and family types. The result indicated that there is a significant difference in the mean score of marital adjustment among male and female couples.Female couples experience more marriage satisfaction than male couples. Mir M. S., Wani M. A. and Sankar R. (2016) conducted a study on marital adjustment among love marriage and arranged marriage couples. The result shows that there is no significant difference between the mean scores of marital adjustment among love marriage and arranged marriage subjects. Saheba K. A. (2019) aimed to evaluate the analysis of marital adjustment among couples.The results show thatthere is asignificant difference in the mean score of marital adjustment among male and female couples. The married males group is having good marital adjustment than married females group. But the same research shows thatthere is no significant difference in the mean score of marital adjustment among the couples of love marriage and arranged marriage**.** Seema R. (2018) compared the marital adjustment of males and females in old age. The results revealed that there is a significant difference in marital adjustment between aged females and aged males. The mean scores indicate that aged males possess better marital adjustment in comparison to aged females. Wani S. and Bakhshi A. (2018)examined in their study the gender differences in marital adjustment and psychological well-being among the dual- career couples. The results revealed a significant gender differences in marital adjustment. Wives had better marital adjustment than their husbands.

OBJECTIVES: Following objectives had been framed for the Study –

- To find out the level of marital adjustment between male and female couples.
- To find out the level of marital adjustment between male and female couples upon various dimensions of marital adjustment such as- sex, social and emotional adjustment.
- To find out the level of marital adjustment between love marriage and arranged marriage couples.
- To find out the level of marital adjustment between love marriage and arranged marriage couples upon various dimension of marital adjustment such as- sex, social and emotional adjustment.

HYPOTHESES: Following hypotheses had been framed for the study –

- There would be no significant difference between mean scores of marital adjustment of male and female couples.
- There would be no significant difference between mean scores of various dimension of marital adjustment such as- sexual, social and emotional adjustment among male and female couples.
- There would be no significant difference between mean scores of marital adjustment upon love marriage and arranged marriage couples.
- There would be no significant difference between mean scores of various dimension of marital adjustment such as- sexual, social and emotional adjustment upon love marriage and arranged marriage couples.

METHOD

SAMPLE: The total sample comprised of 30 married couples who have been selected with the help of randomized sampling technique from Almora district of Uttarakhand. Out of 60 participants, 30 were taken from the female category (15 love marriages and 15 arranged marriages) and 30 were from the male category (15 love marriages and 15 arranged marriages). The age range of the sample was between 28 to 45 years.

Sources of the data: For the study, only primary data was used. The data required for the study was collected using questionnaires that were distributed among the sample chosen from the population of married couples in Almora District of Uttarakhand.

TOOLS: For the collection of Marital Adjustment data "Marital Adjustment Questionnaire" (2018) constructed by Pramod Kumar (Retd.) and Kanchana Rohatgi has been used.The scale has total 25 items measuring three dimensions of adjustment – Sexual, Social and Emotional. The scale consists of three statements. The scoring of positive items are:- 2 for Always, 1 for Some Time and 0 for Never responses and the scoring of negative items are 0 for Always, 1 for Some Time and 2 for Never responses There is no time limit to answer the items, but it generally takes 15-20

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minutes for its completion. Items are scored positively and negatively according to the scoring key provided. The coefficient of correlation found was +0.71 with an index of reliability of 0.84.

Statistical Treatment: After collection of data, Mean, SD and t- test had been calculated to test the significance of means of the groups.

RESULT: Findings have been summarized in the table-1. Table shows the dimension wise Mean, SD and t scores of marital adjustmentof male and female couples and the Table-2 shows the dimension wise Mean, SD and t scores of marital adjustmentof love marriage and arranged marriage couples.

A close perusal of the table -1 shows that the first dimension ofmarital adjustment was sexual adjustment.In this dimension the impact of gender was found significant (t=3.20). However males (M=5.93) have shown more sexual adjustment than females (M=5.33). The second dimension ofmarital adjustment was social. In this dimension the impact of gender was found non-significant(t=1.98). However males (M=14.03) have shown more social adjustment than females (M=13.13). The third dimension of marital adjustment was emotional. In this dimension the impact of gender was found non-significant (2.13). However males (M=22.13) have shown more social adjustment than females (M=19.73).The overall scores on marital adjustment reveals that the impact of gender upon male (M=43.10) and female (M=37.90) was found to be significant (t=2.93).

Table 1– Level of Marital adjustment and its dimensions of female and male couples-

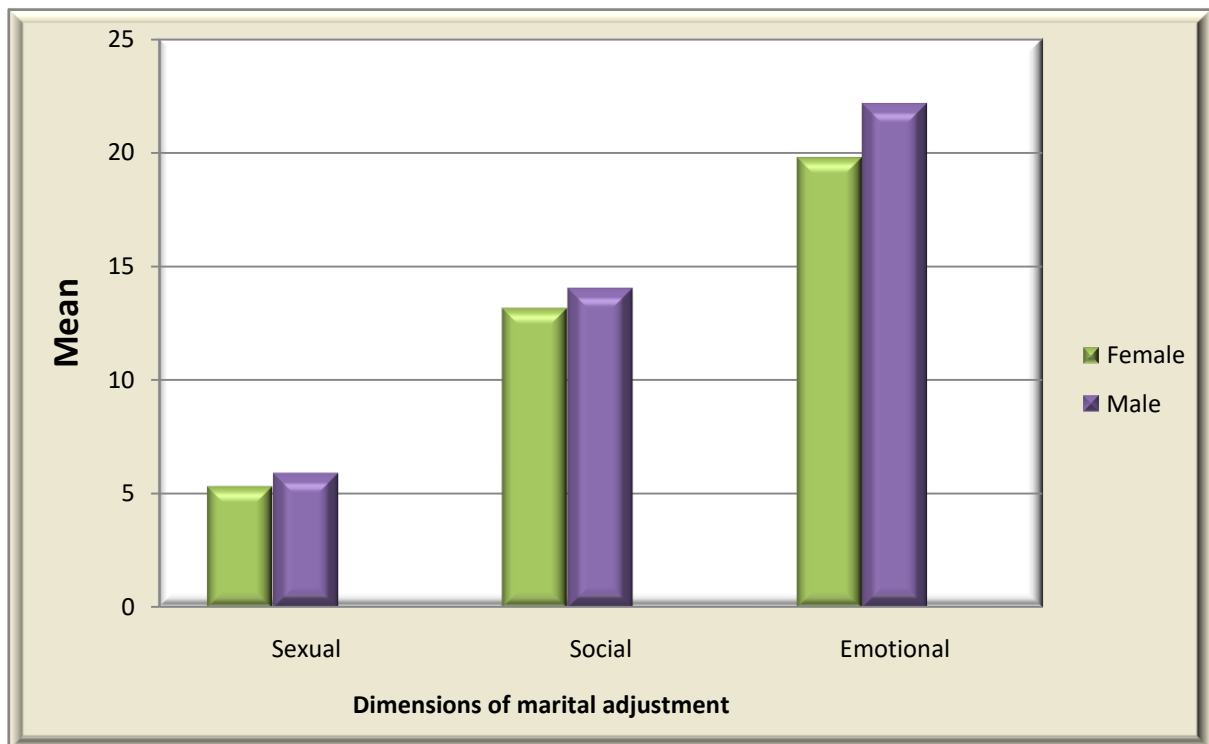| Dimension of marital adjustment	Female			Male			
	N	MEAN	S.D.	N	MEAN	S.D.	T-value
Sexual	30	5.33	.88	30	5.93	.520	3.20
Social	30	13.13	1.96	30	14.03	1.51	1.98
Emotional	30	19.73	5.21	30	22.13	3.30	2.13
Total	30	37.90	6.97	30	42.10	3.66	2.92

Table – 1

Diagram-1

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A close perusal of the table -2 shows that the first dimension ofmarital adjustment was sexual. In this dimension the impact of types of marriage was found non-significant (t=3.13). However love marriage couples (M=6.76) have shown more sexual adjustment than arranged marriage (M=6.50) couples. The second dimension of marital adjustment was social. In this dimension the impact of types of marriage was found non-significant (t=2.30). However love marriage couples (M=14.10) have shown more social adjustment than arranged marriage (M=13.06) couples. The third dimension of marital adjustment was emotional. In this dimension the impact of types of marriage was found non-significant (1.03). However love marriage couples (M=21.53) have shown more social adjustment than arranged marriage couples (M=20.33). The overall scores on marital adjustment reveals that the impact of types of marriage upon love marriage (M=42.40) and arranged marriage (M=39.60) couples was found to be significant (t=1.87).

Table 2– Level of Marital adjustment and its dimensions of love marriage and arranged marriage couples-

Dimension of marital adjustment	Love Marriage			Arrange Marriage			
	N	MEAN	S.D.	N	MEAN	S.D.	T-value
Sexual	30	6.76	.62	30	6.50	.90	1.33
Social	30	14.10	1.37	30	13.06	2.03	2.30
Emotional	30	21.53	4.15	30	20.33	4.80	1.03
Total	30	42.40	4.35	30	39.60	6.93	1.87

Table -2
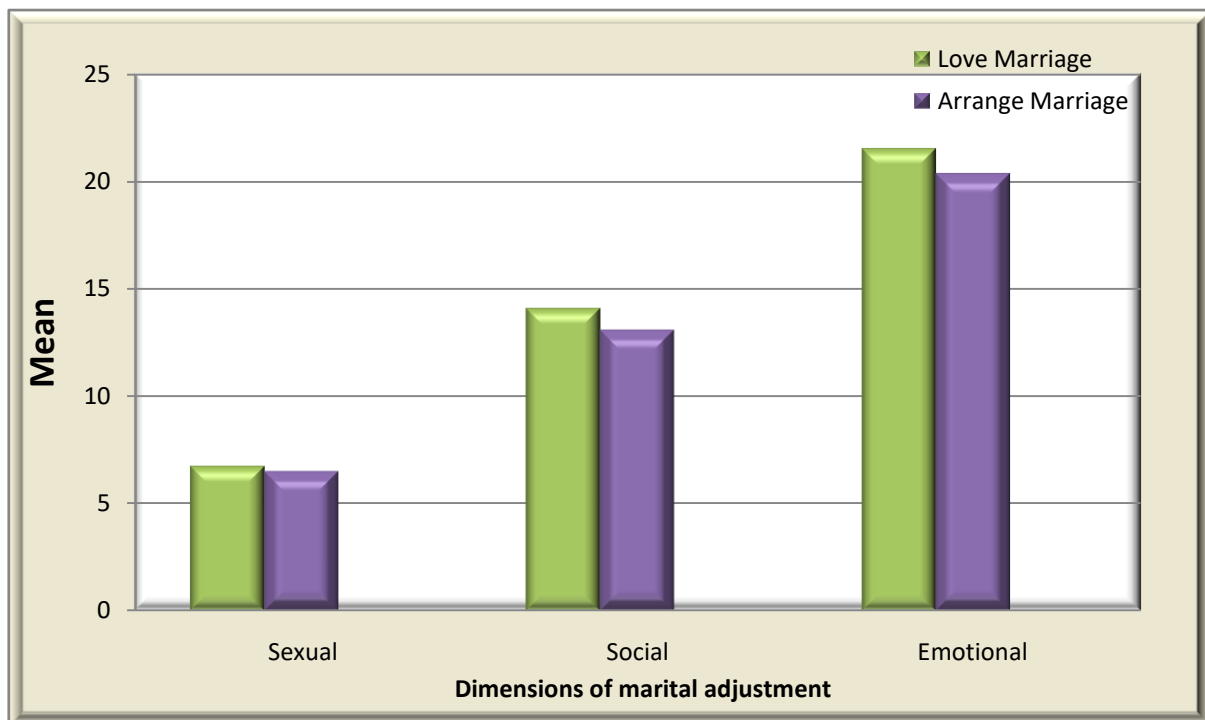
Diagram- 2

DISCUSSION

 In this study, attempts had been made to assess various dimensions of marital adjustment of male-female and love marriage and arranged marriage couples. Three dimensions of marital adjustment had been measured. The first dimension was sexual.In study the impact of gender upon sexual adjustment was found significant. Male couples appeared to have more sexual satisfaction level then female. But in this study the impact of marriage type upon sexual adjustment was not found significant. Love marriage and arranged marriage couples have shown almost equal level ofsexual adjustment. The second dimension was social. In this study the impact of gender and types of marriage upon social adjustment was not found significant. Both groups (male-female and love marriage and arranged marriage)

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couples have shown almost equal level of social adjustment. The third dimension was emotional. In study the impact of gender and type of marriage upon emotional adjustment was not found significant. Both group (male-female and love marriage and arranged marriage) couples have shown almost equal level of emotionaladjustment.

The overall marital adjustment scores of male-female, love marriage and arranged marriage couples have also been compared to assess the overall impact of gender and types of marriage upon marital adjustment. In our study the impact of gender was found significant and it was found that males have shown the higher level of marital adjustment than females. But in our study the impact of marriage type was not found significant and it was found that love marriage and arranged marriage couples have shown almost equal level of marital adjustment.

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ROLE OF GENDER AND RESIDING AREA ON LOCUS OF CONTROL OF COLLEGE STUDENTS

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————————**********————————

ABSTRACT: The present study aims to find out the role of gender and residing area on Locus of Control of college students. For the study 60 students have been taken as sample out of which 30 were boys (rural and urban) and 30 were girls (rural and urban). For the collection of Locus of Control data "Locus of control scale" (1992) N. Hasnain and D.D. Joshi has been used. Results show the role of gender andresiding area was found not significant and girls have shown higher level of Locus of control than boys. But in our study the impact of residing area was not found significant and rural and urban college students have shown almost equal level of Locus of control.
KEYWORDS: Locus of control,Internal, external, personality.

INTRODUCTION: Locus of control is a psychological concept that refers to how strongly people believe they have control over the situations and experiences that affect their lives. There are two types of locus of control: internal (inside) and external (outside). Internal locusof control is the belief that you are "in charge of the events that occur in life."While external locus of control is the belief that "chance, fate, or outside forces determine lifeevents."

Types of Locus of control- There are two types of locus of control:-

1. Internal Locus of Control- When a person believes that he or she is able to act so as to maximize the possibility of good outcomes and to minimize the possibility of bad outcomes he is said to have internal locus of control.

2. External Locus of Control- Those who are always at the mercy of luck, fate andunforeseen uncontrollable outside force and feel helpless all the time and never like to take the responsibility for their bad outcomes and miserable performances in life are said to have external locus of control. Individual differences are seen in this regard. Some people are so devised that they always blame some outside force for their failure, while there are others who do not adopt this attitude.

Factors affecting Locus of Control:

(1) Age: It is assumed that as people grow older, their locus of control become less external and more internal (Gatz and Karel, 2004). They also implied that internality of people may increase up to middle age and thereafter it decreases. The attempt to control the environment becomes more pronounced between the age of 8-14 years.

(2) Gender: As Schultz and Schultz (2005) pointed out, no significant differences in locus of control was found for adults in U.S population. However, they also noted that there may be specific sex-based differences for specific categories of item to assess locus of control e.g. they cited evidence that men may have a greater internal locus for questions related to academic achievement (Strickland & Haley 1980; Schultz & Schultz, 2005).

(3) Cultural impact: The locus of control is presumed to be different among people ofdifferent cultures. For instance, Japanese people tend to be more extroverts in locus of control orientation than people in the United States. Difference in locus of control in different countries within Europe & between the U.S. tends to be small. Different ethnic group in the U.S. have been compared on locus of control. Whites in the U.S. have been compared on locus of control with

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Blacks in the U.S. Black tend to be external than whites, even when socio-economic status is controlled.

REVIEW OF LITERATURE:

Studies related to the impact of gender and residing area on locus of control of college students-

Wali Othman, Vanka Shanthi and Vanka Amit (2021) conducted study on Locus of Control – A Dental Student Perspective. Results revealed that locus of control of dental students is more external as compared to internal locus of control.

Agarwal Ankita and Mulani Chetna (2018) conducted study on well-being, locus of control, gender and sports. Results revealed that there is a significant difference of locus of control between Male and Female students.

Fatemi Vahideh and Hoseiniyan Simin (2016) conducted a Study of Locus of Control in Female and Male M.Sc. Students. The results revealed a significant difference in locus of control between male and female M.Sc. students. The results show that locus of control was more internalized in male M.Sc. students than in female M.Sc. students. Male students attributed their success to themselves and considered external factors to be responsible for their failure. The opposite was true about the female students since they would assume responsibility for the negative consequences of their actions. According to the results, male students had confidence in their abilities whereas female students due to their inbred lack of self-confidence, would constantly wait for confirmation of their actions from their environment.

Manichander and Radhakrishnan (2019) conducted a study on Locus of control of graduate students. In the result there is a significant difference between male and female graduate students in their internal locus of control, but no significant difference between male and female graduate students in their external locus of control.

Mohanty Anwesha (2021) conducted a study on Gender Difference in Locus of Control: A Comparative Study. In the result there is no significant gender difference in locus of control. In this study both male and female students for investigating their gender difference in locus of control concluded no such difference in locus of control scale.

Naik Abdul Raffie (2015) conducted a study on Locus of Control among College Students of Gulbarga City. Results revealed that there is no significant difference on locus of control among males and females, science –arts and urban and rural college students.

Ramya and Thulasidharan (2020) conducted a research on Locus of Control among College Students. The results revealed that there exists difference in the Powerful Others Control dimension of the locus of control scale among male and female college students and under graduate and post graduate college students. The results could not find significant difference in the Internal Control and External Control dimensions of locus of control scale among male and female college students and under graduate and post graduate college students.

Waghmare Ramesh (2020) conducted a research on the Effect of Gender and Location on Locus of Control among College Students. Results revealed that there is a significant difference of locus of control between male and female students. Female students have high internal locus of control than male students and male students have high external locus of control than female students. But in the research there is no significant difference found in locus of control between Urban and Rural college students.

OBJECTIVES: Following objectives had been framed for the Study –

1. To study the difference in Locus of control among girls and boys college students of Nainital District.

2. To study the difference in Locus of con-

trol among Urban and Rural college students of Nainital District.

HYPOTHESES: The following hypotheses had been framed for the Study –

    1. There would be no significant difference on locus of control among girls and boys college students.

    2. There would be no significant difference on locus of control among rural and urban college students.

METHOD

Sample:

    The total sample comprised of 60 students of Degree College. The sample was selected with the help of randomized sampling technique from various degree colleges of Nainital district of Uttarakhand. Out of 60 students 30 were taken from the Girls (15 rural and 15 urban) category and 30 students were from the Boys (15 rural and 15 urban) category. The age range of the sample was between 17 to 23 years of age.
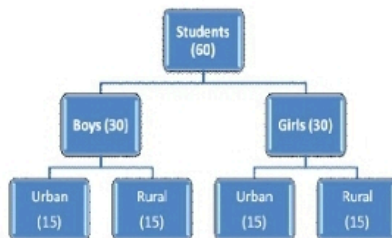
Schematic Presentation of Sample

Sources of the data: For the study, only primary data was used. The data required for the study was collected using questionnaires that were distributed among the sample chosen from the population of the students studying in various colleges in Nainital District (Uttarakhand).

Tools used:

    For the collection of Locus of Control data "Locus of Control Scale (LCS)" (1992) constructed by N. Hasnain and D.D. Joshi has been used. The scale has total 36 items, measuring five dimensions of Locus of control– Life satisfaction, Efficiency, Sociability, Mental health, and Interpersonal relations. Each subscale has 10

items. The scale consists of three statements. The scoring of positive items are 2 for Always, 1 for Some Time and 0 for Never responses and the scoring of negative items are 0 for Always, 1 for Some Time and 2 for Never responses. The high score on the scale is 72 and lowest is 0. Since the positive items are related with internal locus of control and the negative items are related with external locus of control. There is no time limit to answer the items, but it generally takes 15-20 minutes for its completion. Items are scored positively and negatively according to the scoring key provided. The test retest reliability of the test was 0.72 and the internal consistency value for the scale is 0.55. The concurrent validity of the scale was 0.76.

Procedure:

    The administration of the institute was informed and consent to conduct the study was taken. Consent was also taken from the respondents after explaining to them the purpose of the research as well as the academic use of the data later on. Locus of Control test was given individually to all the subjects. Before administering the tests a short intake interview was taken where their doubts related to the tests were dealt with. Simple clarifications of word meanings were given on request without influencing subjects responses. Scoring was done as per the manual.

Statistical Treatment:

    After collection of data, Mean, SD and t-test had been calculated to test the significance of mean of the groups.

RESULTS:

    Findings have been summarized in the table-1. Table-1 shows the dimension wise Mean, SD and t scores of Locus of Control of girls and boys college students and Table-2 shows the dimension wise Mean, SD and t scores of Locus of Control of rural and urban college students.

    A close perusal of the table 1 shows that the first dimension of Locus of Control was In-

ternal control. In this dimension the role of gender was found not significant (t=1.004). However girls (M=25.90) have shown more Internal control than boys (M=24.83) college students. The second dimension of Locus of Control was External control. In this dimension the role of gender was found non-significant (t=0.697). However Girls (M=23.00) have shown more External control than Boys (M=21.48) college students.

Table 1– Level of Locus Of Control of Girls and Boys college students:

Dimensions Of Locus of Control	Boys			Girls			t value	Remarks
	N	Mean	S.D	N	Mean	S.D		
Internal Locus of Control	30	24.83	4.81	30	25.90	3.27	1.004	NS
External Locus of Control	30	21.48	7.05	30	23.00	9.43	0.697	NS
Total	30	45.90	8.90	30	49.17	8.73	1.43	NS

Table-1

Figure 1:- Figure showing the mean values of Girls and Boys College students onLocus Of Control.
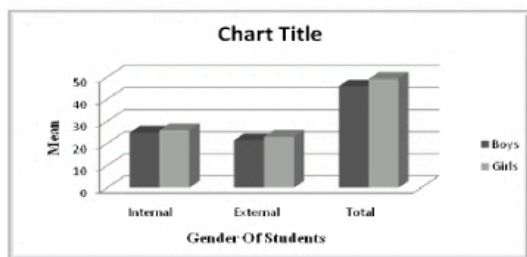
Figure -1

A close perusal of table 2 shows that the first dimension of Locus of control was Internal control. In this dimension the role of residing area was found non-significant (t=1.004). However students residing in rural (M=25.90) have shown more internal control than urban (M=24.83) college students.The second dimension of Locus of control was External control. In this dimension the role of residing area was found non-significant (t=0.572). However urban (M=41.10) have shown more external control than rural (M=21.62) college students.

Table 2– Level of Locus Of Control of Urban and Rural college students:

Dimensions Of Locus of Control	Urban			Rural			t value	Remarks
	N	Mean	S.D	N	Mean	S.D		
Internal Locus of Control	30	24.83	4.81	30	25.90	3.27	1.004	NS
External Locus of Control	30	22.87	7.68	30	21.62	9.01	0.572	NS
Total	30	47.70	8.87	30	47.37	9.45	0.144	NS

Table-2

Figure 2:- Figure showing the mean values of Urban and Rural College students onLocus Of Control.
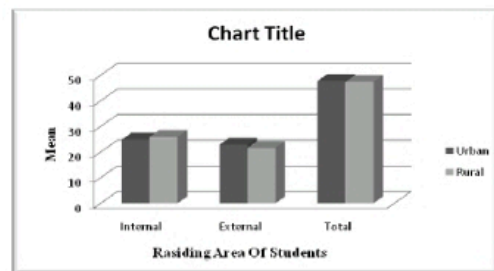
Figure- 2

Discussion:

In this study attempts had been made to assess various dimensions of Locus of Control of girls-boys and rural-urban college students. Two dimensions of Locus of Control had been measured. The first dimension was Internal Locus of Control. It includes an act of person belief that he or she is able to act so as to maximize the possibility of good outcomes and to minimize the possibility of bad outcomes. In our study the impact of gender and residing area was not foundsignificant. Girls appeared to have more Internal Locus of Control than Boys and Rural students appeared to have more Internal Locus of Control than Urban students.

The second dimension was External Locus of Control. It includes an act of person that who are always at the mercy of luck, fate and unforeseen uncontrollable outside force and feel helpless all the time and never like to take the responsibility for their bad outcomes and miserable performances in life. Some people are so devised that they always blame some outside force for their failure. In our study the impact of gender and residing area was not found significant, Girls appeared to have more External Locus of Control than Boys and Urban students appeared to have more External Locus of

Control than Rural students. Our results are in compliance with**Mohanty Anwesha (2021)** who found no significant gender difference in locus of control. **Naik Abdul Raffie (2015)**has found no significant difference on Internal and External locus of control among males and females and urban and rural college students.**Waghmare Ramesh (2020)**has found no significant difference of locus of control between Urban and Rural college students.

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GREAT INDIAN PERSIAN POET & WRITER AMIR KHUSRAW DEHLAWI AND HIS WORKS

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Abstract:- Amir Khusraw is regarded as one of the greatest Persian poets whom India has ever produced. He was not only a great poet but also a great scholar of Persian and Hindi literature and a great Sufi musician who invented the Sitar and Tabla and introduced Qawali, khayal and Tarana. His real name was Abul Hasan Yaminuddin Khusraw but he is popularly known as Amir Khusraw. He represents one of the first Indian personages with a true multi-lingual, multi-cultured and pluralistic identity. His poetry was greatly appreciated and admired in Iran also and he was bestowed the title of **"Tuti-i-Hind"** or The Parrot of India.

Key words: Amir Khusraw,Masnawi, Khamsa, poem, Nizami etc.

Introduction:- Amir Khusraw was born at Patiali, Uttar Pradesh in 1253 A.D. His father Amir Saifuddin Muhammad Shamsi, who was a Turkish officer and was the member of the Lachin tribe of Transoxiana, belonging to Qara-Khitas. Khusraw's father migrated to India just before the invasion of Transoxiana by the Mongol Chengiz Khan and settled in the court of Delhi Sultanate. Khusraw's mother's name was Bibi Daulat Naz. After the death of his father amir Khusraw and his mother came to his maternal grandfather Imadul Mulk. At that time he was only seven years old and he was grown up under the guardianship of his grandfather. He was in the same time a great poet, writer, a great

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Department of Commerce

Publications 2021-22

Prof. Mohan Chandra Pande

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Prof. Mohan Chandra Pande his Bachelor's degree from …. University, Nainital. Master's and Doctorate Degree from ….. He has joined higher education department in 1991. His research interests are ……….. He has published a paper during 2021-22.

1. A study of consumer awareness towards green products and its impact on purchasing decision in Nainital.

A STUDY OF CONSUMER AWARENESS TOWARDS GREEN PRODUCTS AND ITS IMPACT ON PURCHASING DECISION IN NAINITAL

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ABSTRACT

Green product awareness among consumers is important in determining the path of buying behavior of Green products. The purpose of this study is to look into the consumers' awareness regarding Green products and how that affects their purchase decisions. A structured questionnaire contains various items was used to collect data from 200 respondents using survey method. The sampling procedure is convenient and judgmental. Frequency analysis, percentage and cross tabulation are used to analyze the data. According to the findings, self-employed men under the age of 30 who earn less than 2.5 lakh per annum frequently buy green products because they are aware of Green products, and as their income rises, they buy it because these products are relevant to their shopping needs and provide good value for money, whereas homemakers over the age of 40 do not frequently buy green products because they believe these products are more expensive than conventional products. This research also identifies Green product awareness as a major component that influences consumers' Green purchasing decisions.

KEYWORDS: GREEN PRODUCTS, CONSUMER PERCEPTION, COMMUNICATION, ENVIRONMENTAL ISSUES.

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I.　INTRODUCTION

Our society is shifting towards being more environmentally conscious with the shift in consumer preference towards more environmentally friendly goods and services. Firms that do not incorporate environmental friendly practices in their corporate model are punished by their consumers. The shift to being more naturally conscious is presuming a large number of corporate to adopt and implementing environmentally friendly practices. All over the world, the Green movement is growing rapidly at a rapid speed. Consumers are increasingly engaging in appropriate actions and responding to environmental change. As a result of changing consumer behavior, such as increased environmental consciousness and aims to improve the environment more eco-friendly products are being introduced to the market.

A Green product is indicate as naturally produce, bio-degeneratable non-toxic, nonexperimental on living thing, pollution free, nominally packed with natural and permitted factors **(Ottman, 1993)**. Environmentally friendly activities deal, for instance, with better pollution controls, energy-efficient operations, and recycled materials **(Kotler & Armstrong, 2009)**.

The goal of this study is to determine the level of consumer awareness of Green products Uttarakhand state. Environment-friendly, eco-friendly, nature-friendly and green marketing are phrases used to describe goods and services, as well as laws, standards, and policies, that cause little or no harm to ecosystems or the environment. The term of green marketing (offering Green products) encompasses a wide range of activities aimed at enforcing consumer rights, preserving the environment, and meeting customer demand, requirements, and preferences. Consumers are more concerned of their personal safety in today's world, and they want everything to be environmentally friendly, resulting in a greener world.

II.　REVIEW OF LITERATURE

(a) **Banerjee (1995)** from the consumer's point of view, sustainability is a way of life with minimal impact on the environment, or at best, making decisions that are helpful and beneficial to the environment. In order to minimize damage to the environment, consumers are faced with many solutions. A majority of marketers in the sample attempted to project a green marketer image rather than focusing on the environmental benefits of their product or service.

(b) **Pranee (2010)** found that Green advertising must be true, legal and comply with environmental standards, regulations and guidelines. In this study, communication ethics and social responsibility are considered. Besides, it addresses advertising ethics. This is followed by ethical implications of technology. In addition, green marketing ethics and social responsibility are discussed. Moreover, it illustrates green marketing and advertising.

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(c) **Anitha, Mrs & Vijai, C. (2020).** An Empirical Study on Green Products and Green marketing. This research paper examines the consumer perception towards Green product and Green marketing. The main finding was there is no significant relationship between gender, occupation and awareness.

(d) **N, Divyapriyadharshini. (2019).** Consumer awareness towards Green Products and its impact. Consumers are becoming more ecologically conscious and desirous of purchasing Green products. Green products are environment friendly in itself or produced in an eco friendly way. The study has found that promotional activities on Green products influence consumers Green products awareness. Majority of the respondents are aware of Green products. This study also reveals that Green products awareness as the critical factor, which affects consumers buying behaviour.

III. OBJECTIVE OF THE STUDY

(a) To know the impacts of respondent's demographic variables on their awareness towards Green products.

(b) To study the consumers' perception regarding buying Green products.

IV. RESEARCH METHODOLOGY

To accomplish the study's aims, a descriptive research was conducted, which included the collecting of both secondary and primary data. The primary data was collected from respondents of Nainital district of Uttarakhand through a questionnaire created for a sample of 200 respondents from the Nainital representative , both genders, various age groups, educational levels, and annual income. For testing consumer awareness of Green products, a structured questionnaire was constructed. The information gathered from the respondents is compiled and analyzed using percentages and cross tabulation into logical statements. Personal telephonic interviews and observations were also made for further clarification. Ms Excel and SPSS were used to perform the necessary analysis of the data.

V. DATA ANALYSIS

Table 1:	Respondent profile	Frequency	Percentage
Gender	Male	147	**73.5**
	Female	53	26.5
Age	Below 20	68	26.0
	20-30	92	**50.7**
	30-40	21	10.7
	40 above	19	12.7
Occupation	Self employed	69	**34.5**
	Homemaker	38	18.0
	Service	36	19.0
	Student	57	28.5
Annual income	Less than 2.5 lakh	103	**51.5**
	2.5 – 5 lakh	26	13.0

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	5-10 lakh	29	14.5
	10-15 lakh	29	14.5
	More than 15 lakh	13	6.5
Green user	Yes	133	**66.5**
	No	30	15.0
	Often	37	18.5

(Source: Primary data)

The demographic classification and its respective frequency distribution are being presented in the table 1. The demographics of the respondents have been classified into categories as follows;

- Gender- It is found that the dominating Category belongs to male (73.5 per cent).
- Age-It is inferred from the above table that out of 200 respondents, the majority of the respondents (50.7 per cent) belong to the age group of 20-30 years.
- Occupation- Dominating Category of the respondents belonged to the occupational status of self employed (34.5 per cent).
- Annual income- Majority of the respondent's annual Earnings was below 2.5 lakh (51.5 per cent).
- Green users- 66.5% of respondents consider themselves Green users while 15% do not consider themselves Green users and 18.5 % often purchased Green products.

Table 2: showing the relation between occupation and gender with Green users.

GENDER- OCCUPATION				GREEN USERS			TOTAL
				YES	NO	OFTEN	
MALE	OCCUPATION	SELF-EMLOYED	Count	45	2	6	53
			% within occupation	84.9%	3.8%	11.3%	100.0%
		SERVICE	Count	23	6	4	33
			% within occupation	69.7%	18.2%	12.1%	100.0%
		HOMEMAKER	Count	13	8	7	28
			% within occupation	46.4%	28.6%	25.0%	100.0%
		STUDENT	Count	18	6	9	33
			% within occupation	54.5%	18.2%	27.3%	100.0%
FEMALE	OCCUPATION	SELF-	Count	12	2	2	16

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			YES	NO	OFTEN	TOTAL
EMLOYED	% within occupation		75.0%	12.5%	12.5%	100.0%
SERVICE	Count		2	1	0	3
	% within occupation		66.7%	33.3%	0.0%	100.0%
HOMEMAKER	Count		6	2	2	10
	% within occupation		60.0%	20.0%	20.0%	100.0%
STUDENT	Count		14	3	7	24
	% within occupation		58.3%	12.5%	29.2%	100.0%

(Source: Collected and computed through primary data)

The relationship between gender and occupation with Green users is presented in the table 2. From this table, it is concluded that self employed males and female students are frequently buy Green products.

Table 3: showing the relation between income level and gender with Green users.

				GREEN USERS			
GENDER-INCOME LEVEL				**YES**	**NO**	**OFTEN**	**TOTAL**
MALE	**INCOME**	**LESS THAN 2.5 LAKH**	Count	60	7	9	76
			% within income	78.9%	9.2%	11.8%	100.0%
		2.5- 5 LAKH	Count	11	4	5	20
			% within income	55.0%	20.0%	25.0%	100.0%
		5- 10 LAKH	Count	15	5	3	23
			% within income	65.2%	21.7%	13.0%	100.0%
		10-15 LAKH	Count	11	2	7	20
			% within income	55.0%	10.0%	35.0%	100.0%
		15 LAKH ABOVE	Count	2	4	2	8
			% within income	25.0%	50.0%	25.0%	100.0%
FEMALE	**INCOME**	**LESS THAN 2.5 LAKH**	Count	15	5	7	27
			% within income	55.6%	18.5%	25.9%	100.0%
		2.5- 5 LAKH	Count	4	1	1	6

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	% within income		66.7%	16.7%	16.7%	100.0%
5- 10 LAKH	Count	4	1	1	6
	% within income	66.7%	16.7%	16.7%	100.0%
10-15 LAKH	Count	6	1	2	9
	% within income	66.7%	11.1%	22.2%	100.0%
15 LAKH ABOVE	Count	5	0	0	5
	% within income	100.0%	0.0%	0.0%	100.0%

(Source: Collected and computed through primary data)

The relationship between gender and income level with Green users is presented in the table 3. From this table, it is concluded that male and female whose income is less than 2.5 lakh are frequently buy Green products.

Table 4: showing the cross tabulation among gender, green users, age group with occupation.

				OCCUPATION				
GENDER-GREEN USERS- AGE GROUP				**SELF-EMPLOYED**	**SERVICE**	**HOMEMAKER**	**STUDENT**	**TOTAL**
MALE	**YES**	**AGE**	**BELOW 20**	11	15	6	9	41
			20-30	28	6	7	5	46
			30-40	4	1	0	4	9
			ABOVE 40	2	1	0	0	3
		TOTAL		45	23	13	18	99
	NO	**AGE**	**BELOW 20**	0	0	2	3	5
			20-30	1	4	2	0	7
			30-40	1	1	0	2	4
			ABOVE 40	0	1	4	1	6
		TOTAL		2	6	8	6	22
	OFTEN	**AGE**	**BELOW 20**	1	1	3	5	10
			20-30	1	2	2	1	6
			30-40	3	1	1	2	7
			ABOVE 40	1	0	1	1	3
		TOTAL		6	4	7	9	26
	TOTAL	**AGE**	**BELOW 20**	12	16	11	17	56
			20-30	30	12	11	6	59
			30-40	8	3	1	8	20
			ABOVE 40	3	2	5	2	12
		TOTAL		53	33	28	33	147
FEMALE	**YES**	**AGE**	**BELOW 20**	0	0	0	5	5
			20-30	12	1	4	8	25
			ABOVE 40	0	1	0	1	4

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	TOTAL		12	2	6	14	34
NO	AGE	BELOW 20	0	0	1	2	3
		20-30	2	0	1	1	4
		ABOVE 40	0	1	2	0	3
	TOTAL		2	1	4	3	10
OFTEN	AGE	BELOW 20	1	0	1	2	4
		20-30	1	0	0	3	4
		30-40	0	0	1	0	1
		ABOVE 40	0	0	0	2	2
	TOTAL		2	0	2	7	11
TOTAL	AGE	BELOW 20	1	0	2	9	12
		20-30	15	1	5	12	33
		30-40	0	0	1	0	1
		ABOVE 40	0	2	2	3	7
	TOTAL		16	3	10	24	53

(Source: Collected and computed through primary data)

The relationship between gender and income level with Green users is presented in the table 4. From this table, it is concluded that self employed male below 30 years whose annual income is less than 2.5 lakh frequently buy green products and homemaker whose age is above 40 do not frequently buy green products.

Table 5: Reasons for buying Green products	Frequency	percentage
I think Green products are relevant to my shopping needs	55	**27.5**
I am aware of Green products	35	17.5
Easy availability of the Green products	17	8.5
The wide variety of Green products	17	8.5
I trust Green–product claims	19	9.5
I think Green products are of superior quality	14	7.0
Value for money	43	21.5

(Source: Primary data)

Table 5 shows that majority (27.5) of respondents believe that purchasing Green products are relevant to their shopping needs is the biggest reason for buying Green products.

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Table 6: showing the relation between gender, occupation and age group with reasons for buying Green products.

INCOME LEVEL-OCCUPATION-AGE GROUP				I think Green products are relevant to my shopping needs	I am aware of Green products	Easy availability of the Green products	The wide variety of Green products	I trust Green–product claims	I think Green products are of superior quality	Value for money	Total
LESS THAN 2.5 LAKH	SELF-EMPLOYED	AGE	BELOW 20	1	1	0	2	0	0	3	7
			20-30	7	11	1	0	1	1	4	25
			30-40	3	0	0	0	0	1	0	4
			ABOVE 40	0	1	0	0	0	0	0	1
	SERVICE	AGE	BELOW 20	1	0	0	1	1	0	9	12
			20-30	2	1	0	0	0	0	2	5
			ABOVE 40	0	1	0	0	0	0	0	1
	HOMEMAKER	AGE	BELOW 20	4	0	1	1	0	1	1	8
			20-30	3	2	0	0	0	1	1	7
			30-40	0	0	0	0	1	0	0	1
			ABOVE 40	0	0	0	0	0	0	2	1
	STUDENT	AGE	BELOW 20	3	1	2	0	3	3	3	15
			20-30	3	0	1	0	2	2	1	9
			30-40	3	0	0	0	0	2	1	6
			ABOVE 40	0	0	0	1	0	0	0	1
2.5- 5 LAKH	SELF-EMPLOYED	AGE	BELOW 20	1	0	0	2	0	0	0	3
			20-30	1	0	2	1	1	0	1	6
			30-40	0	0	0	0	0	0	1	1
			ABOVE 40	0	1	0	0	0	0	0	1
	SERVICE	AGE	BELOW 20	0	0	1	0	0	0	1	2
			20-30	0	0	0	0	1	0	0	1
			30-40	0	1	0	0	0	0	0	1
			ABOVE 40	0	0	0	1	0	0	0	1
	HOMEMAKER	AGE	BELOW 20	1	0	0	0	0	0	0	1
			20-30	0	1	0	0	1	0	0	2
			ABOVE 40	0	0	0	0	0	0	2	2
	STUDENT	AGE	BELOW 20	1	1	0	0	0	0	1	3
			20-30	1	1	0	0	0	0	0	2
			ABOVE 40	0	1	1	1	0	0	1	4
5- 10 LAKH	SELF-EMPLOYED	AGE	BELOW 20	0	0	0	1	0	0	0	1
			20-30	2	0	1	0	0	0	2	5
			30-40	0	0	0	0	0	1	0	1
			ABOVE 40	1	0	0	0	0	0	0	1
	SERVICE	AGE	BELOW 20	0	0	0	0	1	0	0	1
			20-30	1	1	0	0	0	0	0	2
			30-40	0	1	0	0	0	0	0	1
			ABOVE 40	0	0	0	1	0	0	0	1
	HOMEMAKER	AGE	BELOW 20	0	1	0	0	1	0	0	2
			20-30	1	1	1	0	0	0	1	4
			ABOVE 40	0	0	0	0	0	1	2	3
	STUDENT	AGE	BELOW 20	2	0	0	0	0	0	0	2
			20-30	2	0	0	0	1	0	0	3
			30-40	0	0	0	1	0	1	0	2
10-15 LAKH	SELF-EMPLOYED	AGE	BELOW 20	1	0	0	0	0	0	1	2
			20-30	4	0	0	0	0	0	2	6
			30-40	0	0	1	0	0	0	0	1
	SERVICE	AGE	BELOW 20	1	0	0	0	0	0	0	1
			20-30	0	0	0	1	1	0	1	3
			30-40	0	0	0	1	0	0	0	1
			ABOVE 40	0	1	0	0	0	0	0	1
	HOMEMAKER	AGE	BELOW 20	1	0	0	0	0	0	0	1
			20-30	1	1	1	0	0	0	0	

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			30-40	0	0	0	0	0	1	0	1
			ABOVE 40	0	0	0	0	0	0	1	1
	STUDENT	AGE	BELOW 20	1	0	3	1	0	0	0	5
			20-30	1	0	0	1	0	0	0	2
			ABOVE 40	0	1	0	0	0	0	0	1
15 LAKH ABOVE	SELF-EMPLOYED	AGE	20-30	1	0	0	0	0	0	2	3
			30-40	0	1	0	0	0	0	0	1
	SERVICE	AGE	20-30	0	0	0	0	1	0	1	2
	HOMEMAKER	AGE	BELOW 20	0	0	0	0	0	0	1	1
	STUDENT	AGE	BELOW 20	1	0	0	0	0	0	0	1
			20-30	0	0	0	0	1	0	1	2
			ABOVE 40	0	2	0	0	1	0	0	3

(Source: Collected and computed through primary data)

The relationship between gender, occupation and age group with reasons to buy Green products is presented in the table 6. From this table, it is concluded that self employed male and female whose age group is less than 30 are frequently bought Green products because they aware the benefits of Green products and when their income exceeds they motivate because of it suited with their shopping needs and they consider it as value for money.

Table 7: Reasons for not buying Green products	Frequency	Percentage
Don't think Green products are relevant to shopping needs	19	9.5
I am unaware of Green products	37	18.5
Don't know where to find Green products	19	9.5
Feel there are not enough Green product options	24	12.0
Don't trust Green–product claims	17	8.5
I think Green products are of lesser quality	21	10.5
I think Green products are too expensive	**63**	**31.5**

(Source: Primary data)

Table 7 shows that majority (31.5 per cent) of respondents believe that Green products are too expensive than conventional products so, this is the biggest reason for not buying Green products.

Table 8: showing the relation between gender, occupation and age group with reasons for not buying Green products.

INCOME LEVEL-OCCUPATION-AGE GROUP				REASONS FOR NOT BUYING GREEN PRODUCTS							Total
				Don't think Green products are relevant to shopping needs	I am unaware of Green products	Don't know where to find Green products	Feel there are not enough Green product options	Don't trust Green–product claims	I think Green products are of lesser quality	I think Green products are too expensive	
LESS THAN 2.5 LAKH	SELF-EMPLOYED	AGE	BELOW 20	1	1	0	0	0	1	4	7
			20-30	1	2	1	1	3	1	16	25
			30-40	0	1	0	1	1	0	1	4
			ABOVE 40	0	0	1	0	0	0	0	1
	SERVICE	AGE	BELOW 20	1	1	0	1	0	0	9	12
			20-30	1	1	0	0	0	0	15	53

Income	Occupation		Age Group								Total
			ABOVE 40	1	0	0	0	0	0	1	1
	HOMEMAKER	AGE	BELOW 20	3	5	0	3	0	1	1	13
			20-30	0	4	0	1	0	1	3	9
			30-40	0	2	0	0	0	0	1	1
			ABOVE 40	0	0	0	0	0	0	1	1
	STUDENT	AGE	BELOW 20	3	0	2	2	3	0	5	15
			20-30	2	1	1	1	3	1	0	9
			30-40	2	1	0	0	1	1	1	6
			ABOVE 40	0	0	1	0	0	0	0	1
2.5- 5 LAKH	SELF-EMPLOYED	AGE	BELOW 20	0	0	0	2	1	0	0	3
			20-30	0	1	0	1	1	0	3	6
			30-40	0	0	0	0	0	0	1	1
			ABOVE 40	0	0	1	0	0	0	0	1
	SERVICE	AGE	BELOW 20	0	0	0	0	0	0	2	2
			20-30	0	0	1	0	0	0	0	1
			30-40	0	0	1	0	0	0	0	1
			ABOVE 40	0	0	0	1	0	0	0	1
	HOMEMAKER	AGE	BELOW 20	0	0	0	0	0	0	1	1
			20-30	0	0	0	0	0	2	0	2
			ABOVE 40	0	0	0	0	0	0	2	2
	STUDENT	AGE	BELOW 20	0	0	1	0	2	0	0	3
			20-30	0	0	0	0	2	0	0	2
5- 10 LAKH	SELF-EMPLOYED	AGE	BELOW 20	0	0	0	0	0	1	0	1
			20-30	1	1	0	0	1	1	1	5
			30-40	0	1	0	0	0	0	0	1
			ABOVE 40	0	0	0	0	1	0	0	1
	SERVICE	AGE	BELOW 20	0	0	0	0	1	0	0	1
			20-30	0	1	0	0	0	0	1	2
			30-40	1	0	0	0	0	0	0	1
			ABOVE 40	0	0	0	0	0	0	1	1
	HOMEMAKER	AGE	BELOW 20	0	0	0	0	1	0	1	2
			20-30	1	1	0	0	1	0	1	4
			ABOVE 40	0	0	1	0	0	0	2	3
	STUDENT	AGE	BELOW 20	0	2	0	0	2	0	0	2
			20-30	0	0	0	0	3	0	0	3
			30-40	0	0	0	2	0	0	0	2
10-15 LAKH	SELF-EMPLOYED	AGE	BELOW 20	0	0	1	0	0	0	1	2
			20-30	1	2	0	0	0	2	1	6
			30-40	0	0	1	0	0	0	0	1
	SERVICE	AGE	BELOW 20	0	0	0	0	0	0	1	1
			20-30	0	0	0	0	0	2	1	3
			30-40	0	0	0	0	0	0	1	1
			ABOVE 40	0	0	1	0	0	0	0	1
	HOMEMAKER	AGE	BELOW 20	1	0	0	0	0	0	0	1
			20-30	1	1	1	0	0	0	0	3
			30-40	0	1	0	0	0	0	0	1
			ABOVE 40	0	0	0	0	0	0	1	1
	STUDENT	AGE	BELOW 20	0	1	0	1	1	1	1	5
			20-30	0	0	0	1	1	0	0	2
			ABOVE 40	0	0	0	0	0	0	1	1
ABOVE 15 LAKH	SELF-EMPLOYED	AGE	20-30	0	0	1	1	0	0	1	3
			30-40	0	0	0	0	1	0	0	1
	SERVICE	AGE	20-30	0	0	0	0	1	0	1	2
	HOMEMAKER	AGE	BELOW 20	0	0	0	0	0	0	1	1
	STUDENT	AGE	BELOW 20	0	0	0	0	0	1	0	1
			20-30	0	0	0	0	1	0	1	2
			ABOVE 40	0	0	0	0	1	0	1	2

(Source: Collected and computed through primary data)

The relationship between gender, occupation and age group with reasons not to buy Green products is presented in the table 8. From this table, it is concluded that service sector employees believes that they do not purchase Green products because Green products 54

costlier than conventional products and it is not suited with their shopping needs and homemaker above 40 age do not frequently buy Green products because they also believe that Green products are too expensive.

VI. RESULT AND DISCUSSION

The objective of this study is to look at consumers' awareness regarding green products and how that influenced their purchasing decisions. Various green product sources are useful instruments for instilling green product awareness in consumers. As people are more aware of green products, their purchase decisions are influenced. This study explains that consumers' understanding of green products is a critical aspect that influences their green purchasing decisions.

This study reveals that males are more aware about the benefits of Green products but when their earnings exceeds 15 lakh per annum they shown less interest but females shown more interest for purchasing Green products. This Study shows that self employed male below 30 years whose earning is less than 2.5 lakh per annum frequently buy Green products because of their awareness and when their income increases, they buy it because these products are relevant to their shopping needs and value for money but homemakers above 40 age do not frequently buy green products because they feel green products are too expensive than conventional products. As a result, there is a strong association between green product awareness and green purchasing decisions.

VII. CONCLUSION

Environment is constantly changing; so we have a responsibility to protect it. Consumers are growing more environmentally concerned and want to buy things that are good for the environment. This study demonstrates the market's reach for Green products and how the products meet the needs of the customers. Recently, changes in consumer lifestyles, increasing awareness of hazardous chemicals, rising disposable income, proven effectiveness of natural products, and increasing attention to environmental issues have prompted companies to use these changes for the benefit of consumers. The use of Green products will assist people in changing their lifestyle to one that is more environmentally friendly. However, people's awareness of the benefits of using Green products is quite minimal. People must be educated on how to use Green products and how to recognise the Green features of the products they use. This would aid in the preservation of the ecosystem for future generations.

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Department of Mathematics

Publications 2021-22

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1. Application of generalized hypergeometric functions to computer graphics.
2. A review of fractal geometry: mathematical approach.
3. An overview of the status of women in mathematics.
4. An Attendance System using face Recognition Through Mathematics
5. Fundamental Mathematics Volume-I (Theory of Equations and Matrices) [**Text book**]
6. Fundamental Mathematics Volume- II (Theory of Trignometry and Vector Calculas) [**Text book**]

APPLICATION OF GENERALIZED HYPERGEOMETRIC FUNCTIONS TO COMPUTER GRAPHICS

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ABSTRACT

In general, 2D graphics uses a two-dimensional representation of real-world objects, stored as images in the computer for being rendered and manipulated. Transformation, in graphics, is the process of manipulation of images. In this research paper, I have created 2D – Graphics from the generalized hypergeometric function $_pF_q\{((a));((b));x\};\forall a_{i's},b_{j's},x \in \mathbf{R}$ *by using MATLAB software. They can be transformed via multiplication by matrices of generalized hypergeometric function.*

Keyword - Generalized hypergeometric function, MATLAB, Matrices, Computer Graphics.

INTRODUCTION

Computer graphics is the life line of today's computer world. Today, computers and computer-generated images touch many aspects of daily life. Computer imagery is found on television, in newspapers, for example in weather reports, or for example in all kinds of medical investigation and surgical procedures. A well-constructed graph can present complex statistics in a form that is easier to understand and interpret. In the media "such graphs are used to illustrate papers, reports, thesis", and other presentation material. A very popular use of computer graphics is for advertising. Almost every poster, commercial, banner, etc. that you have ever seen was on a computer screen being designed and edited at one point. 'Visual Effects' in movies help enhance the audiences' perception of a film. Businesses need computer graphics for company logos, presentations, and websites. Book covers, video game cases, CD, DVD, and Blu-Ray cases all of those graphics are designed using computers. Almost anything that was not designed manually with a paint brush or pencil used some sort of computer graphics. Of course, many of these graphics are first drafted using a utensil like a pencil or paintbrush, and then a graphics artist might use a computer to transform it further. 2D computer graphics started in the 1950s, based on vector graphics devices. These were largely supplanted by raster-based devices in the following decades. The X Window System protocol

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and Page description language in the electronic publishing and desktop publishing were landmark developments in the field.

Computer graphics play a fundamental role in engineering design, capturing the visual and quantitative aspects of the geometric objects. Many of the most important programs for computer graphics are written in traditional programming languages (Fortran, Pascal, C, etc.) However, in the last recent years, the general-purpose numerical computation programs (NCPs) are gaining more and more popularity. Today, they are well established as a powerful alternative to the traditional programming languages in many different areas, as mechanical engineering, signal processing, quality control, electronic circuits, etc.

In this context, it seems natural to look for the application of the NCPs instead of the traditional programming languages, in the present work. The main reasons to apply MATLAB as the NCP to be used in this work have been on account of following reasons:

- Spreading MATLAB is used for hundreds of thousands of industrial, government and academic users around the world.
- Graphical capabilities, which raise many of the current graphics-oriented programs.
- Since MATLAB is based on C, it runs faster than other analyzed symbolic and numerical programs. Moreover, its basic element is an array that does not require dimensioning, so it takes less time to be computed.
- MATLAB commands, options and utilities are useful for rendering surfaces.
- MATLAB handles vectors and matrices in a straightforward and intuitive way.

The workers presently engaged in computer graphics are Zhigang Xiang et al (2000), Krishnamurthy (2001), Samuel R. Buss (2003), Jeffrey J. McConnell (2006), John A. Vince (2007) Frank Klawonn (2008), Peter Shirley et al (2009) and John A. Vince (2010).

In the category of applications to computer graphics, I code the work of Ankur Rana et al (2019) in extensive study of 2d transformations in computer graphics. another important work is David J. Eck Hobart et al, (2018) in Introduction to computer graphics. I also see the work of Ms. A. J. Rajeswari Joe et al (2013) in Scaling Transform Methods Advanced Computing.

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In the category of applications to computer graphics, I may code the work of Ankur Rana et al (2019) in extensive study of 2d transformations in computer graphics. I also see the work of Ms. A. J. Rajeswari Joe et al (2013) in Scaling Transform Methods Advanced Computing. I see the work of David J. Eck Hobart et al, (2018) Introduction to computer graphics Santos Otto L. et al (1989) in field application of computer graphics for monitoring borehole trajectories. The application of computer graphics interactive techniques to the production of coronary arteriography reports can be seen in the work of Andy Stergachis et al (1991). In the category of other noticeable and relevant works we can cite the names of F.P.Vidal *et al (2006)* for applications of computer graphics in medicine. Another important work is of Steven D. Galbraith (2008) on pairing based cryptography. De Caro D. et al **(2009)** have presented an account of their work on high-performance special function unit for programmable 3-D graphics processors. We can also quote the work of Werner Purgathofer et al (2010) for eye tracking trends in computer graphics.

1 2D GRAPHICS OF LETTER N

The capital letter N in fig 1 is determined by eight points, or vertices which are in the form of a generalized hypergeometric function $_pF_q\left\{\left((a)\right);\left((b)\right);x\right\}$. The coordinates of the point can be stored in the data matrix, D. Here we take Kummer function $_1F_1$ (-1; b; x) all the eight vertex defined corresponding to the values of b and x given below

0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1
0.1	0.1	0.7	0.1	0.1	0.1	0.7	0.1	0.1

Values of b

Values of x

0.1	0.3	0.3	0.7	0.7	1.3	1.3	0.1	0.1
0.1	0.1	5.2	0.1	0.9	0.9	1.8	0.9	0.1

Vertex

$$
\begin{array}{c}
 \quad\quad 1 \quad\quad\quad 2 \quad\quad\quad 3 \quad\quad\quad\quad 4 \\
\dfrac{x-Coordinate}{y-Coordinate}\begin{bmatrix} {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.2;0.3) & {}_1F_1(-1;0.2;0.3) & {}_1F_1(-1;0.1;0.7) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.7;5.2) & {}_1F_1(-1;0.1;0.1) \end{bmatrix}
\end{array}
$$

$$
\left.\begin{matrix} {}_1F_1(-1;0.1;0.7) & {}_1F_1(-1;0.2;1.3) & {}_1F_1(-1;0.2;1.3) & {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0.1) \\ {}_1F_1(-1;0.1;0.9) & {}_1F_1(-1;0.1;0.9) & {}_1F_1(-1;0.7;1.8) & {}_1F_1(-1;0.1;0.9) & {}_1F_1(-1;0.1;0.1) \end{matrix}\right] = D
$$

$$
\quad\quad 5 \quad\quad\quad 6 \quad\quad\quad\quad 7 \quad\quad\quad\quad 8 \quad\quad\quad\quad 9
$$

FIG 1

MATLAB PROGRAM FOR FIG 1

```
>>X=[hypergeom(-1,0.1,0.1)     hypergeom(-1,0.2,0.3)     hypergeom(-1,0.2,0.3)     hypergeom(-1,0.1,0.7)

hypergeom(-1,0.1,0.7) hypergeom(-1,0.2,1.3) hypergeom(-1,0.2,1.3) hypergeom(-1,0.1,0.1) hypergeom(-

1,0.1,0.1)];

>>Y=[hypergeom(-1,0.1,0.1)     hypergeom(-1,0.1,0.1)     hypergeom(-1,0.7,5.2)     hypergeom(-1,0.1,0.1)

hypergeom(-1,0.1,0.9)     hypergeom(-1,0.1,0.9)     hypergeom(-1,0.7,1.8)     hypergeom(-1,0.1,0.9)

hypergeom(-1,0.1,0.1)];

>>D = [X; Y];

>>Plot(X,Y);
```

The main reason behind description of graphical objects as collections of straight-line segments is that the standard transformations in computer graphics map line segments onto other line segments .Once the vertices that describe an object have been transformed, their images can be connected with the appropriate straight lines to produce the complete image of the original object.

Given $A = \begin{bmatrix} {}_1F_1(-1;0.1;0) & {}_1F_1(-1;0.4;0.3) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0) \end{bmatrix}$, describe the effect of the shear transformation

$x \longmapsto Ax$ on the letter N in fig 1

By definition of matrix multiplication, the columns of the product AD contain the images of the vertices of the letter N.

$$AD = \begin{bmatrix} {}_1F_1(-1;0.1;0) & {}_1F_1(-1;0.4;0.3) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0) \end{bmatrix}\begin{bmatrix} {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.2;0.3) & {}_1F_1(-1;0.2;0.3) & {}_1F_1(-1;0.1;0.7) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.7;5.2) & {}_1F_1(-1;0.1;0.1) \end{bmatrix}$$

$$\begin{matrix} {}_1F_1(-1;0.1;0.7) & {}_1F_1(-1;0.2;1.3) & {}_1F_1(-1;0.2;1.3) & {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0.1) \\ {}_1F_1(-1;0.1;0.9) & {}_1F_1(-1;0.1;0.9) & {}_1F_1(-1;0.7;1.8) & {}_1F_1(-1;0.1;0.9) & {}_1F_1(-1;0.1;0.1) \end{matrix} \Big]$$

Vertex

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

$$AD = \begin{bmatrix} 0 & 0.5 & 2.105 & 6 & 8 & 7.5 & 5.895 & 2 & 0 \\ 0 & 0 & 6.420 & 0 & 8 & 8 & 1.580 & 8 & 0 \end{bmatrix}\begin{matrix} x - Coordinate \\ \hline y - Coordinate \end{matrix}$$

(Result of this multiplication with the help of MATLAB)

The transformed vertices are plotted in fig 2, along with connecting line segment that correspond to those in the original figure. The italic N in Fig 3 looks a bit too wide. To compensate, we can shrink the width by a scale transformation.

FIG 2

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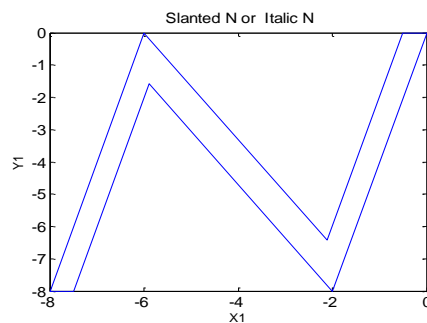
MATLAB PROGRAM FOR FIG 2

>>X=[hypergeom(-1,0.1,0.1)   hypergeom(-1,0.2,0.3)   hypergeom(-1,0.2,0.3)   hypergeom(-1,0.1,0.7)

hypergeom(-1,0.1,0.7) hypergeom(-1,0.2,1.3) hypergeom(-1,0.2,1.3) hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0.1)];

>>Y=[hypergeom(-1,0.1,0.1)   hypergeom(-1,0.1,0.1)   hypergeom(-1,0.7,5.2)   hypergeom(-1,0.1,0.1)

hypergeom(-1,0.1,0.9)   hypergeom(-1,0.1,0.9)   hypergeom(-1,0.7,1.8)   hypergeom(-1,0.1,0.9)

hypergeom(-1,0.1,0.1)];

>> D = [X; Y];

>>A=[hypergeom(-1,0.1,0) hypergeom(-1,0.4,0.3); hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0)];

>> AD = A*D;

>> X1 = AD (1, :);

>> Y1 = AD (2, :);

>> Plot(X1, Y1);

Compute the matrix of the transformation that performs a shear transformation, as in fig 1, and then scales all x- coordinates by a factor of $_1F_1$ (-1, 0.4, 0.1).

The matrix that multiplies the x- coordinates of a point by $_1F_1$ (-1, 0.4, 0.1) is

$$B = \begin{bmatrix} {}_1F_1(-1;0.4;0.1) & {}_1F_1(-1;0.1;0.1) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0) \end{bmatrix}$$

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So the matrix of the composite transformation is

$$BA = \begin{bmatrix} {}_1F_1(-1;0.4;0.1) & {}_1F_1(-1;0.1;0.1) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0) \end{bmatrix} \begin{bmatrix} {}_1F_1(-1;0.1;0) & {}_1F_1(-1;0.4;0.3) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0) \end{bmatrix}$$

By definition of matrix multiplication, the columns of the product BAD contain the images of the vertices of the letter N.

$$BAD = \begin{bmatrix} {}_1F_1(-1;0.4;0.1) & {}_1F_1(-1;0.1;0.1) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0) \end{bmatrix} \begin{bmatrix} {}_1F_1(-1;0.1;0) & {}_1F_1(-1;0.4;0.3) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0) \end{bmatrix} \begin{bmatrix} {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.2;0.3) & {}_1F_1(-1;0.2;0.3) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.7;5.2) \end{bmatrix}$$

$$\begin{bmatrix} {}_1F_1(-1;0.1;0.7) & {}_1F_1(-1;0.1;0.7) & {}_1F_1(-1;0.2;1.3) & {}_1F_1(-1;0.2;1.3) & {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0.1) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0.9) & {}_1F_1(-1;0.1;0.9) & {}_1F_1(-1;0.7;1.8) & {}_1F_1(-1;0.1;0.9) & {}_1F_1(-1;0.1;0.1) \end{bmatrix}$$

<div align="center">Vertex</div>
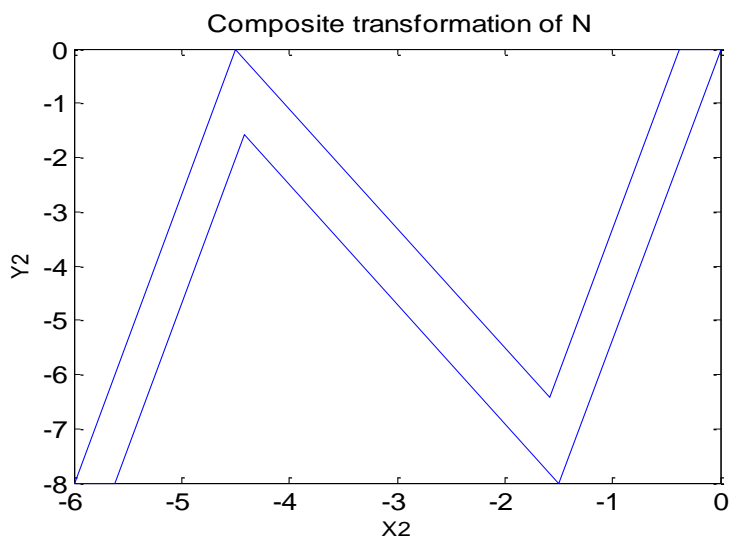
<div align="center">1   2   3   4   5   6   7   8   9</div>

$$BAD = \begin{bmatrix} 0 & -0.375 & -1.5804 & -4.5 & -6 & -5.625 & -4.4196 & -1.5 & 0 \\ 0 & 0 & -6.4286 & 0 & -8 & -8 & -1.5714 & -8 & 0 \end{bmatrix} \begin{matrix} x-Coordinate \\ \hline y-Coordinate \end{matrix}$$

(Result of this multiplication with the help of MATLAB)

The result of this composite transformation is shown in fig 3

<div align="center">FIG 3</div>

MATLAB PROGRAM FOR FIG 3

```
>>X=[hypergeom(-1,0.1,0.1)    hypergeom(-1,0.2,0.3)    hypergeom(-1,0.2,0.3)    hypergeom(-1,0.1,0.7)
hypergeom(-1,0.1,0.7) hypergeom(-1,0.2,1.3) hypergeom(-1,0.2,1.3)    hypergeom(-1,0.1,0.1)
hypergeom(-1,0.1,0.1)];

>>Y=[hypergeom(-1,0.1,0.1)    hypergeom(-1,0.1,0.1)    hypergeom(-1,0.7,5.2)    hypergeom(-1,0.1,0.1)
hypergeom(-1,0.1,0.9)  hypergeom(-1,0.1,0.9)  hypergeom(-1,0.7,1.8)              hypergeom(-1,0.1,0.9)
hypergeom(-1,0.1,0.1)];

>> D = [X; Y];

>>A=[hypergeom(-1,0.1,0) hypergeom(-1,0.4,0.3); hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0)];

>>B=[hypergeom(-1,0.4,0.1) hypergeom(-1,0.1,0.1); hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0)];

>> BA = B*A;

>> BAD = BA*D;

>> X2 = BAD(1,:);

>> Y2 = BAD(2,:);

>> plot(X2, Y2);
```

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2. 2D GRAPHICS OF LETTER W

The capital letter W in fig 4 is determined by ten points, or vertices which are in the form of a generalized hypergeometric function $_pF_q\left\{\left((a)\right);\left((b)\right);x\right\}$. The coordinates of the point can be stored in the data matrix, D. Here we take

Kummer function $_1F_1$ (-1; b; x) and all the ten vertex defined corresponding to the values of b and x given below

Values of b

0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1
0.1	0.1	0.7	0.4	0.7	0.1	0.1	0.1	0.2	0.1	0.1

Values of x

0.1	0.3	0.3	0.4	1.3	1.3	0.7	0.7	0.4	0.1	0.1
0.1	0.1	5.2	1.8	5.2	0.1	0.1	0.9	1.1	0.9	0.1

Vertex

$$
\begin{array}{cccccc}
 & 1 & 2 & 3 & 4 & 5 \\
\frac{x-Coordinate}{y-Coordinate} & \begin{bmatrix} 1F1(-1,0.1,0.1) & 1F1(-1,0.2,0.3) & 1F1(-1,0.2,0.3) & 1F1(-1,0.1,0.4) & 1F1(-1,0.2,1.3) \\ 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.1) & 1F1(-1,0.7,5.2) & 1F1(-1,0.4,1.8) & 1F1(-1,0.7,5.2) \end{bmatrix}
\end{array}
$$

$$
\begin{bmatrix}
1F1(-1,0.2,1.3) & 1F1(-1,0.1,0.7) & 1F1(-1,0.1,0.7) & 1F1(-1,0.1,0.4) & 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.1) \\
1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.9) & 1F1(-1,0.2,1.1) & 1F1(-1,0.1,0.9) & 1F1(-1,0.1,0.1)
\end{bmatrix} = D
$$

$$
\begin{array}{cccccc}
6 & 7 & 8 & 9 & 10 & 11 & \text{FIG 4}
\end{array}
$$

MATLAB PROGRAM FOR FIG 4

>>X=[hypergeom(-1,0.1,0.1)   hypergeom(-1,0.2,0.3)   hypergeom(-1,0.2,0.3)   hypergeom(-1,0.1,0.4)
hypergeom(-1,0.2,1.3) hypergeom(-1,0.2,1.3) hypergeom(-1,0.1,0.7) hypergeom(-1,0.1,0.7) hypergeom(-1,0.1,0.4) hypergeom(-1,0.1,0.1)   hypergeom(-1,0.1,0.1)];

>>Y=[hypergeom(-1,0.1,0.1)   hypergeom(-1,0.1,0.1)   hypergeom(-1,0.7,5.2)   hypergeom(-1,0.4,1.8)
hypergeom(-1,0.7,5.2) hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0.9) hypergeom(-1,0.2,1.1) hypergeom(-1,0.1,0.9)   hypergeom(-1,0.1,0.1)];

>>D = [X; Y];

>>plot(X,Y);

The main reason graphical objects are described by collections of straight-line segments is that the standard transformations in computer graphics map line segments onto other line segments .Once the vertices that describe an object have been transformed, their images can be connected with the appropriate straight lines to produce the complete image of the original object.

Given $A = \begin{bmatrix} {}_1F_1(-1;0.1;0) & {}_1F_1(-1;0.4;0.3) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0) \end{bmatrix}$, describe the effect of the shear transformation x $\longmapsto$

 Ax on the letter W in fig 4. By definition of matrix multiplication, the columns of the product AD contain the images of the vertices of the letter W.

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$$AD = \begin{bmatrix} {}_1F_1(-1;0.1;0) & {}_1F_1(-1;0.4;0.3) \\ {}_1F_1(-1;0.1;0.1) & {}_1F_1(-1;0.1;0) \end{bmatrix} \begin{bmatrix} 1F1(-1,0.1,0.1) & 1F1(-1,0.2,0.3) & 1F1(-1,0.2,0.3) & 1F1(-1,0.1,0.4) & 1F1(-1,0.2,1.3) \\ 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.1) & 1F1(-1,0.7,5.2) & 1F1(-1,0.4,1.8) & 1F1(-1,0.7,5.2) \end{bmatrix}$$

$$\begin{bmatrix} 1F1(-1,0.2,1.3) & 1F1(-1,0.1,0.7) & 1F1(-1,0.1,0.7) & 1F1(-1,0.1,0.4) & 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.1) \\ 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.9) & 1F1(-1,0.2,1.1) & 1F1(-1,0.1,0.9) & 1F1(-1,0.1,0.1) \end{bmatrix}$$

Vertex

$$AD = \begin{matrix} \quad 1 \quad\quad 2 \quad\quad 3 \quad\quad\quad 4 \quad\quad\quad 5 \quad\quad\quad 6 \quad\quad 7 \quad\quad 8 \quad\quad 9 \quad\quad\quad 10 \quad 11 \\ \begin{bmatrix} 0 & -0.5 & -2.1071 & -3.875 & -7.1071 & -5.5 & -6 & -8 & -4.125 & -2 & 0 \\ 0 & 0 & -6.4286 & -3.5 & -6.4286 & 0 & 0 & -8 & -4.5 & -8 & 0 \end{bmatrix} \end{matrix} \begin{matrix} x - Coordinate \\ \overline{y - Coordinate} \end{matrix}$$

(Result of this multiplication with the help of MATLAB)

The transformed vertices are plotted in fig 5, along with connecting line segment that correspond to those in the original figure. The italic W in Fig 5 looks a bit too wide. To compensate, we can shrink the width by a scale transformation.

FIG 5

Italic W
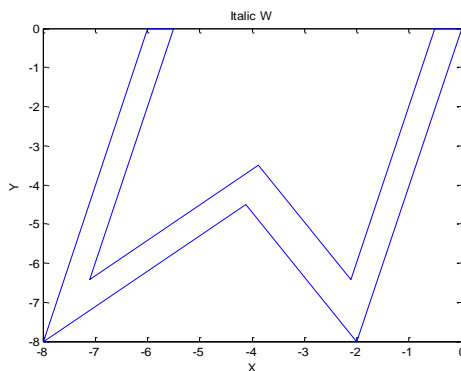
MATLAB PROGRAM FOR FIG 5

```
>>X=[hypergeom(-1,0.1,0.1)    hypergeom(-1,0.2,0.3)    hypergeom(-1,0.2,0.3)    hypergeom(-1,0.1,0.4)
hypergeom(-1,0.2,1.3) hypergeom(-1,0.2,1.3) hypergeom(-1,0.1,0.7) hypergeom(-1,0.1,0.7) hypergeom(-
1,0.1,0.4)  hypergeom(-1,0.1,0.1)      hypergeom(-1,0.1,0.1)];

>>Y=[hypergeom(-1,0.1,0.1)    hypergeom(-1,0.1,0.1)    hypergeom(-1,0.7,5.2)    hypergeom(-1,0.4,1.8)
hypergeom(-1,0.7,5.2)  hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0.9) hypergeom(-
1,0.2,1.1)  hypergeom(-1,0.1,0.9)      hypergeom(-1,0.1,0.1)];
```

\>>D = [X; Y];

\>>A=[hypergeom(-1,0.1,0) hypergeom(-1,0.4,0.3); hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0)];

\>> AD = A*D;

\>> X1 = AD (1, :);

\>> Y1 = AD (2, :);

\>> plot(X1,Y1)

Compute the matrix of the transformation that performs a shear transformation, as in fig 4, and then scales all x- coordinates by a factor of $_1F_1$ (-1, 0.4, 0.1).

The matrix that multiplies the x- coordinates of a point by $_1F_1$ (-1, 0.4, 0.1) is

$$B = \begin{bmatrix} {_1}F_1(-1;0.4;0.1) & {_1}F_1(-1;0.1;0.1) \\ {_1}F_1(-1;0.1;0.1) & {_1}F_1(-1;0.1;0) \end{bmatrix}$$

So the matrix of the composite transformation is

$$BA = \begin{bmatrix} {_1}F_1(-1;0.4;0.1) & {_1}F_1(-1;0.1;0.1) \\ {_1}F_1(-1;0.1;0.1) & {_1}F_1(-1;0.1;0) \end{bmatrix} \begin{bmatrix} {_1}F_1(-1;0.1;0) & {_1}F_1(-1;0.4;0.3) \\ {_1}F_1(-1;0.1;0.1) & {_1}F_1(-1;0.1;0) \end{bmatrix}$$

By definition of matrix multiplication, the columns of the product BAD contain the images of the vertices of the letter W.

$$BAD = \begin{bmatrix} {_1}F_1(-1;0.4;0.1) & {_1}F_1(-1;0.1;0.1) \\ {_1}F_1(-1;0.1;0.1) & {_1}F_1(-1;0.1;0) \end{bmatrix} \begin{bmatrix} {_1}F_1(-1;0.1;0) & {_1}F_1(-1;0.4;0.3) \\ {_1}F_1(-1;0.1;0.1) & {_1}F_1(-1;0.1;0) \end{bmatrix} \begin{bmatrix} 1F1(-1,0.1,0.1) & 1F1(-1,0.2,0.3) & 1F1(-1,0.2,0.3) \\ 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.1) & 1F1(-1,0.7,5.2) \end{bmatrix}$$

$$\begin{bmatrix} 1F1(-1,0.1,0.4) & 1F1(-1,0.2,1.3) & 1F1(-1,0.2,1.3) & 1F1(-1,0.1,0.7) & 1F1(-1,0.1,0.7) & 1F1(-1,0.1,0.4) & 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.1) \\ 1F1(-1,0.4,1.8) & 1F1(-1,0.7,5.2) & 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.1) & 1F1(-1,0.1,0.9) & 1F1(-1,0.2,1.1) & 1F1(-1,0.1,0.9) & 1F1(-1,0.1,0.1) \end{bmatrix}$$
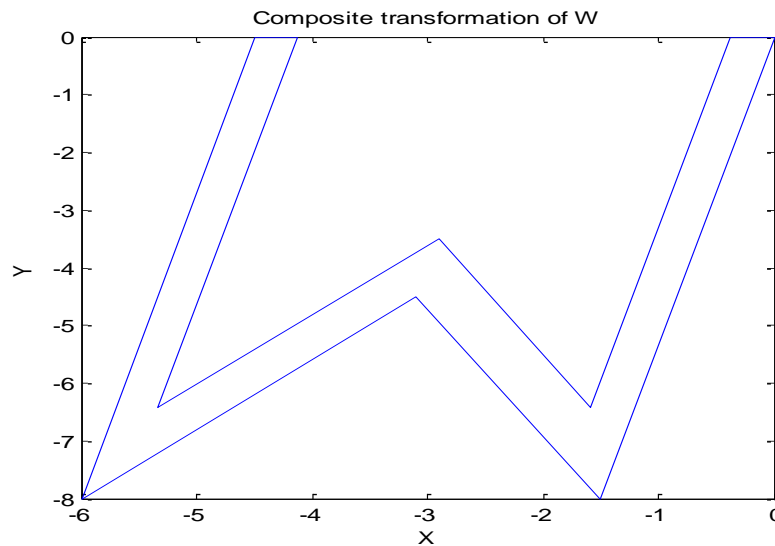
Vertex

1	2	3	4	5	6	7	8	9	10	11	

$$BAD = \begin{bmatrix} 0 & -0.375 & -1.5804 & -2.9.63 & -5.3304 & -4.125 & -4.5 & -6 & -3.0938 & -1.5 & 0 \\ 0 & 0 & -6.4286 & -3.5 & -6.4286 & 0 & 0 & -8 & -4.5 & -8 & 0 \end{bmatrix} \begin{matrix} x-Coordinate \\ y-Coordinate \end{matrix}$$

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(Result of this multiplication with the help of MATLAB)

The result of this composite transformation is shown in fig 6

FIG 6

Composite transformation of W

MATLAB PROGRAM FOR FIG 6

>>X=[hypergeom(-1,0.1,0.1)   hypergeom(-1,0.2,0.3)   hypergeom(-1,0.2,0.3)   hypergeom(-1,0.1,0.4)

hypergeom(-1,0.2,1.3) hypergeom(-1,0.2,1.3) hypergeom(-1,0.1,0.7) hypergeom(-1,0.1,0.7) hypergeom(-1,0.1,0.4) hypergeom(-1,0.1,0.1)   hypergeom(-1,0.1,0.1)];

>>Y=[hypergeom(-1,0.1,0.1)   hypergeom(-1,0.1,0.1)   hypergeom(-1,0.7,5.2)   hypergeom(-1,0.4,1.8)

hypergeom(-1,0.7,5.2) hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0.9) hypergeom(-1,0.2,1.1) hypergeom(-1,0.1,0.9)   hypergeom(-1,0.1,0.1)];

>> D = [X; Y];

>>A=[hypergeom(-1,0.1,0) hypergeom(-1,0.4,0.3); hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0)];

>>B=[hypergeom(-1,0.4,0.1) hypergeom(-1,0.1,0.1); hypergeom(-1,0.1,0.1) hypergeom(-1,0.1,0)];

>> BA = B*A;

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```
>> BAD = BA*D;

>> X2 = BAD(1,:);

>> Y2 = BAD(2,:);

>> plot(X2, Y2);
```

3 HOMOGENEOUS COORDINATES

Each point ($_pF_q\left\{((a));((b));x\right\}$, $_pF_q\left\{((a));((b));y\right\}$) ∈ R^2 can be identified with the

point ($_pF_q\left\{((a));((b));x\right\}$, $_pF_q\left\{((a));((b));y\right\}$, 1) on the plane in R^3 that lies one unit above the

xy-plane. We say that ($_pF_q\left\{((a));((b));x\right\}$, $_pF_q\left\{((a));((b));y\right\}$) has homogeneous coordinates (

$_pF_q\left\{((a));((b));x\right\}$, $_pF_q\left\{((a));((b));y\right\}$, 1). For instance, the point ($_1F_1$ (-1; 0.1; 0.2), $_1F_1$ (-1; 0.1;

0.3)) has homogeneous coordinates ($_1F_1$ (-1; 0.1; 0.2), $_1F_1$ (-1; 0.1; 0.3), 1). Homogeneous coordinates for

points are not added or multiplied by scalars, but they can be transformed via multiplication by 3X3

matrices of generalized hypergeometric function.

3.1 TRANSLATION

A translation of the form ($_pF_q\left\{((a));((b));x\right\}$, $_pF_q\left\{((a));((b));y\right\}$) ↦ (

$_pF_q\left\{((a));((b));x\right\} + _pF_q\left\{((a));((b));h\right\}$, $_pF_q\left\{((a));((b));y\right\} + _pF_q\left\{((a));((b));k\right\}$) is

written in homogeneous coordinates as ($_pF_q\left\{((a));((b));x\right\}$, $_pF_q\left\{((a));((b));y\right\}$, 1) ↦ (

$_pF_q\left\{((a));((b));x\right\} + _pF_q\left\{((a));((b));h\right\}$, $_pF_q\left\{((a));((b));y\right\} + _pF_q\left\{((a));((b));k\right\}$, 1). This

transformation can be computed via matrix multiplication:

$$\begin{bmatrix} 1 & 0 & _pF_q\{((a));((b));h\} \\ 0 & 1 & _pF_q\{((a));((b));k\} \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} _pF_q\{((a));((b));x\} \\ _pF_q\{((a));((b));y\} \\ 1 \end{bmatrix} = \begin{bmatrix} _pF_q\{((a));((b));x\} + _pF_q\{((a));((b));h\} \\ _pF_q\{((a));((b));y\} + _pF_q\{((a));((b));k\} \\ 1 \end{bmatrix}$$

Any linear transformation on R^2 is represented with respect to Homogeneous coordinates by a partitioned

matrix of the form

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$$\begin{bmatrix} A & 0 \\ 0 & 1 \end{bmatrix}$$, where A is a 2X2 matrix.

Typical examples are

$$\begin{bmatrix} \cos\phi & -\sin\phi & 0 \\ \sin\phi & -\cos\phi & 0 \\ 0 & 0 & 1 \end{bmatrix},$$

Counterclockwise rotation about the origin, angle ϕ

$$\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix},$$

Reflection through $_pF_q\left\{((a));((b));x\right\}$ = x

$$\begin{bmatrix} _pF_q\left\{((a);((b));s\right\} & 0 & 0 \\ 0 & _pF_q\left\{((a);((b));t\right\} & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

scale $_pF_q\left\{((a));((b));x\right\}$ by $_pF_q\left\{((a));((b));s\right\}$

and $_pF_q\left\{((a));((b));y\right\}$ by $_pF_q\left\{((a));((b));t\right\}$

3.2 Composite Transformations

The movement of a figure on a computer screen often requires two or more basic transformations. The composition of such transformations corresponds to matrix multiplication when homogeneous coordinates are used.

The 3X3 matrix that corresponds to the composite transformation of a scaling by $_1F_1$ (-1; 1; 0.7), a rotation of 90^0, and finally a translation that adds ($_1F_1$ (-1; 0.2; 0.3), $_1F_1$ (-1; 0.1; 0.3)) to each point of a figure,

If ϕ = π / 2, then sinϕ = 1 and cosϕ = 0.We have

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$$\begin{bmatrix} {}_1F_1(-1;0.1;x) \\ {}_1F_1(-1;0.1;y) \\ 1 \end{bmatrix} \xrightarrow{Scale} \begin{bmatrix} {}_1F_1(-1;1;0.7) & 0 & 0 \\ 0 & {}_1F_1(-1;1;0.7) & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} {}_1F_1(-1;0.1;x) \\ {}_1F_1(-1;0.1;y) \\ 1 \end{bmatrix}$$

$$\xrightarrow{Rotate} \begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} {}_1F_1(-1;1;0.7) & 0 & 0 \\ 0 & {}_1F_1(-1;1;0.7) & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} {}_1F_1(-1;0.1;x) \\ {}_1F_1(-1;0.1;y) \\ 1 \end{bmatrix}$$

$$\xrightarrow{Translate} \begin{bmatrix} 1 & 0 & {}_1F_1(-1;0.2;0.3) \\ 0 & 1 & {}_1F_1(-1;0.1;0.3) \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} {}_1F_1(-1;1;0.7) & 0 & 0 \\ 0 & {}_1F_1(-1;1;0.7) & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} {}_1F_1(-1;0.1;x) \\ {}_1F_1(-1;0.1;y) \\ 1 \end{bmatrix}$$

the matrix for the composite transformation is

$$\begin{bmatrix} 1 & 0 & {}_1F_1(-1;0.2;0.3) \\ 0 & 1 & {}_1F_1(-1;0.1;0.3) \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} {}_1F_1(-1;1;0.7) & 0 & 0 \\ 0 & {}_1F_1(-1;1;0.7) & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & -{}_1F_1(-1;1;0.7) & {}_1F_1(-1;0.2;0.3) \\ {}_1F_1(-1;1;0.7) & 0 & {}_1F_1(-1;0.1;0.3) \\ 0 & 0 & 1 \end{bmatrix}$$

CONCLUSION

2D computer graphics are mainly used in applications that were originally developed upon traditional printing and drawing technologies, such as typography, cartography, technical **drawing** advertising etc. In those applications, the two-dimensional image is not just a representation of a real-world object, but an independent artifact with added semantic value; two-dimensional models are therefore preferred, because they give more direct control of the image than 3D computer graphics (whose approach is more akin to photography than to typography). In this paper I have discussed various

transformations along with their matrix representations. I have created different *2D – Graphics from the generalized hypergeometric function* ${}_pF_q\{((a));((b));x\}$ different graphics Translation, Rotation, Reflection and their combinations are the rigid transformations because in these transformations the pre-image and image are of same size and shape (congruent). Scaling and Shearing are not rigid transformations because they produce images with different size or shape.

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A REVIEW OF FRACTAL GEOMETRY: MATHEMATICAL APPROACH

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Abstract:

In this article, we will analyze and locate fragments as close to themselves as possible to the fractal. Looking at the results, we see some similarities about the properties ascribed to expressed fractals that are conceptualized by the explicit method. Our reasoning is restricted to tracking the mathematical method for managing the acting of fractals so that we can spread out mathematical situations related to fractals.

Keywords:

Fractals, Iterations, Area, Perimeter, Fractal Dimension

Introduction

In this article we will illustrate a piece of well-known memorable thinking in the field of mathematics known as fractal evaluation. Fractal computation is a completely new area of estimation in the field of PC programming and orchestrating today. It has a broad assembly of objectives. Fractals are so confusing and flying in nature that it is basically impossible to show them using standard evaluation objects.

As can undoubtedly be self-evident, fractals are incredibly entangled and regularly have extraordinary numerical shapes that can be constructed by focal principles. We have tried to solve the related number behind these unimaginable numerical figures called fractals. We have assessed their size (breaking point and area) and fractal approaches to estimate whether the technique should be of type acting relative to the fractal.

Fractal evaluation strategies allow one to quantitatively characterize similar or self-related visual figures and work with intriguing/deep evaluations of standard things in different scales. They furthermore give license to think about the potential escalation of examinations from different scales.

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In order to reliably build scale and fractal self-closeness of fractal visual figures, sensible morphometric features should be used, and a sensible scale should be chosen, so that they can be outlined in a representative and objective manner.

Various distinct components of the scene appear to be fractals; A model can be a useless model and a valley affiliation or edge. The system for fractal evaluation consists of a mathematical explanation that can actually be applied in geomorphology. As with extravagant plans, the method of managing the brashness of common qualities is at the forefront of evaluation.

The fractal approach and other fractal boundaries in geomorphology are essentially used to quantitatively characterize the geology of visible fractal shapes and to model their evolution.

When depicting the fractal position of complex geomorphic networks, it is fundamental to know and respect the fundamental considerations of fractal mathematics, for example, fractal perspective, differentially homogeneous scales, fractal self-proportionality, or the canonical origin of the structure.

Thus the potential between the fractal and topological approaches refers to the level of division of a given thing. According to the topological point of view the more fractal perspective movement there is, the more distributed the thing is.

The important units of the waste model are likewise channels, and the central units of the valley network are thalways. The shape and thickness of the leak model and the valley network are the result of geomorphological correction of the entire locale and reflect the influence of lithological-stove distant bases (plan) and deterioration on the progression of the scene.

Complex geomorphological associations allow great and unbiased surveys by morphometric features. These characteristics reflect the moderate relationship of units within the connection and some consider the relationship between the degrees of affiliation.

The clear development governing general fractal mathematics and the use of its structures in various fields of science were decided to delineate and audit important terms of fractal conjecture.

Relative models of connections by referring to structures illustrate the association away from the stream springs to the estuary. First deal guides are sections of a stream from stream springs to the major local area, for example differences in redirects in association.

According to a mathematical point of view, numerical correction in fractals is reproduced to an infinitesimal, for example the edge will appear to an unimaginably vast degree in an infinitesimal length. There are certain limitations with the fractal plan of visual figures that cannot be made a reliable, reliable real endpoint for growth.
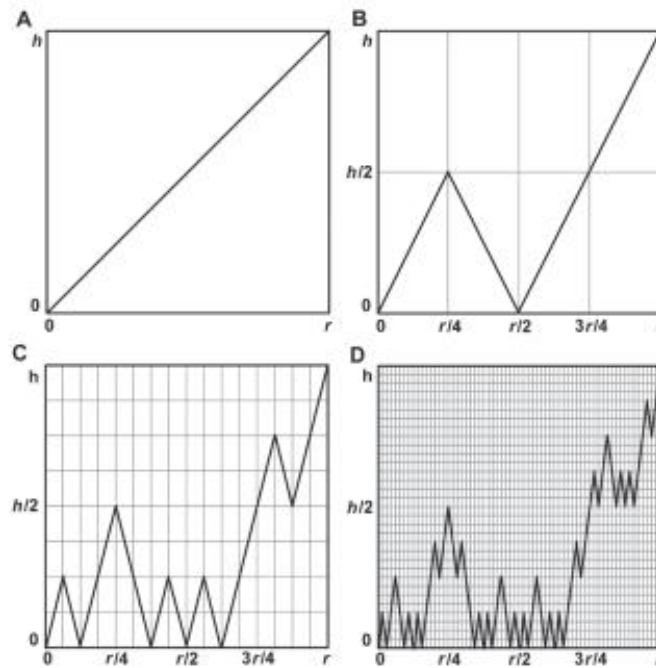

Figure 1: Self-Associating Fractals

The value of the fractal perspective reflects how much the district is filled with channels or canyons. Increasing the value of the fractal portion of the waste events mentioning X+1 recommends how many channels the trades of X+1 have widened or the length of the increment mentioning X+1. , and the spillage plans in it fill the audit area beyond a shadow of a doubt. The waste model and the fractal part of the valley network differ in different districts (taking into account the effect of the original base, taking into account the activities carried out) and, undoubtedly, within a singular space when changing the scale.

REVIEW OF FRACTAL GEOMETRY

Fractal computation is a piece of science that emphasizes eccentric models made up of parts that are like a sum in one way or another or another. The pictures we call fractals are known for much more than a basic stretch in mathematics. The articles, for example, Cantor sets, C triangles, and Koch turns have appeared as often as possible in mathematical synthesis over the course of years. Despite this, these items were once seen as originally

masochistic shapes, according to the general view of premium in mathematical estimation [13, 18].

All this has changed in the last 20 years. Two events occurred in that period, which expressed fractal evaluation in contemporary science and the ideal of number rearrangement. Mathematician Benot Mandelbrot's first insight was that fractals are of mathematical interest, yet conjecture in nature. He observed that various things in the customary world were fractal in appearance [15, 17].

Plants, fog, trees, beaches and various other "irregular shapes" can be best solved using fractal approximation instead of Euclidean math. Without a doubt, while the straight lines, triangles and circles of Euclidean calculations are Goliaths for individuals to build ranges, houses, roads, and as such, nature makes its things undeniably empowering [8]. Specialized things are overall more complicated and have more numerical properties. As we will see, they can be a large part of the time any one displays with fractals.

People are now using and studying a significant number of fractals a ton more than just science. Fractals arise in the system: amazing new developments, the human lung, and the vascular system are opportunities for fractals. A monster number of fractal radio wire schemes have been proposed. The motivation to drive this paper is to show the various applications in the field of distant correspondence and the important movement of fractal receiving wire [12].

We note that at each step of the cycle, we keep as a whole the line parts that form the boundary of the triangles from the last iteration, and we obtain new line pieces from the new triangles in the mass. Starting with the three line parts, we get a new one for each triangle of the kth feature.

Figure 2: Sierpinski Triangle or Gasket

As we probably know, in each level, a quarter of the triangle is hit. That is, after the main circle, three-fourth of the area of the required triangle remains. Appropriately, it is not difficult to impress that, given n assertions, the district of Sierpinski's triangle will necessarily be (0.75) n times the area of the triangle. So after several consecutive cycles, you'll find that there was no locale that used all possible means. [5]

In fractal mathematics the mathematical fractal set should be thought of as an infinitely coordinated series of mathematical things depicted on an estimation space [13]. We begin the evaluation of fractals by presenting the fundamental cycle by which fractals are created, to emphasize clearly. Cycle means to repeat a correspondence over and over again [4]. There are different types of iteration cycles in mathematics. By a wide margin most of the emphasis would be unifying mathematical rules or corrections. We start with some mathematical shape or figure called a seed. Then, at that point, we use a mathematical method on this seed. This mathematical development is known as the thrust rule. Standard size can be separated or consolidated crushing or cutting [2]. After doing this activity we get another shape. Then we assert; It proposes that we use a similar technique on the new figure to create goings with the figure. Then, we, at that point, repeat this association again, endlessly applying the complement rule to create the motion of the data.

Fractal dimension

It is clearly a reality that typical mathematical drawings tend to have a fragmented view. The Sierpinski triangle gives a clear procedure for finding out why this should be so. To understand the possibility of the fractal approach, it is fundamental to understand what we mean by perspective in any case. Clearly, a line has perspective 1, a plane has perspective 2, and a solid shape has perspective 3. It is entering the battle to understand why these pieces of insight are real.

A line approaches 1 because there is basically 1 system to move along a line. Similarly, the aircraft's approach is 2, because it has 2 headings in which to move. There are actually 2 headings in a row - - inverted and forward - - and the plane differs continuously. There are actually 2 straight free headings in the plane [9]. Obviously, this is correct. By the way, the prospect of a straight open door is incredibly startling and testing to convey. We say in many cases that the plane is two-layered in light of the fact that it has "two perspectives", which means length and width. Furthermore, a concrete shape is three-layered, in that it has "three perspectives", length, width, and level [7]. Once again this is a proven idea, yet not given in particularly cautious numerical language.

So why can one agree that the plane is one-layered and the plane is two-layered? Note that these two articles are self-comparable. We can break a line piece into 4 self -close expands, each roughly the same length, and which can be improved by a variable of 4 to get the main part [1, 16]. We can correspondingly break a line segment into 7 self-congruent

pieces, each with an enhancement factor 7, or 20 self-congruent pieces with a correction factor 20. With each upgrade factor n.

One class is unusual. We can degrade a class into 4 self-comparing subclasses, and the upgrade factor here is 2. Of course, we can break the square into 9 self-relativistic pieces with an escalation factor 3, or 25 self-comparable pieces with a correction factor. 5. Obviously, the square can be broken down into N2 self-comparing duplicates of itself, which must be upgraded by a fraction of N to obtain the fundamental figure. See Figure-3. Finally, we can convert a 3D shape into N3 self-equivalent pieces, all of which have a correction factor N.

Finally we see an alternative procedure for selecting pieces of a self-comparable object: perspective essentially positions how many self-comparative pieces with increasing N considering the figure can be broken.
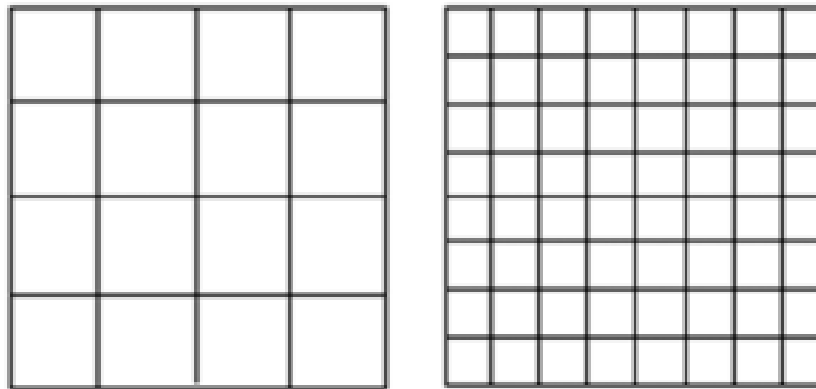
Figure 3: A square can be broken into N2 self-similar pieces
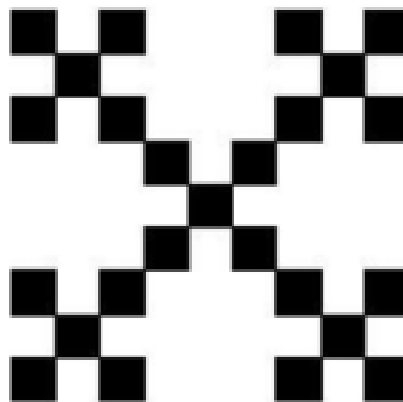
Figure 4: Box Fractal

Conclusion

Here we try to sort out fractals with their mathematical properties. A mathematical visualization is performed for a piece of a known fractal. We register the space, line and self-similar part of a pair of fractals. We see that there is a closeness in the fractals regarding the said property. Fractals created by the Tantamount process have similar mathematical properties. The focus on the fractal tends to zero the area of the fractal created under the edge and categorical process for the most part managing infinitesimals. This result can be normalized to fractals. Further investigation is considered to arrive at a decision.

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AN OVERVIEW OF THE STATUS OF WOMEN IN MATHEMATICS

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Abstract

In less than a decade, the expression "the position of women in mathematics" was rarely used. Rather one heard the expressions "absence of women in mathematics" and "absence of their influence on mathematics", despite the fact that women were not entirely absent and had participated in the vast majority of great and sustained achievements in mathematics. Traditionally, only casual recognition is given to mathematicians of either gender, and scholars rarely learn anything about the originators of mathematics until they are in the history of mathematics curriculum. Yet, in fact the omission of women to quote in history books is shocking.

When the majority of female mathematicians are mentioned on each, it is to their further temporary toil, especially when relating to the lives of notorious men. It actually helps perpetuate the myth that mathematics is a mystical field. It is not clear how much or how much the reality of the Part Model drives women to come to mathematicians, but certainly the recognition that women have had an impact on mathematics cannot be a deterrent.

Keywords:

Women, Mathematics, History

Introduction

The memoirs of this decade that trace the part of various women in the history of mathematics, make this history available to a large cult, create a good pride that cannot be ignored and which is listed in its positive consequences. should be counted in. decade. The sexism that has historically prevented all women from achieving gender equality in math is compounded by systematic racial discrimination for women of color. In addition to overcoming misogynistic programs, women of color in the reckoning must overcome racism. According to the most recent analysis of the National Science Foundation's knowledge and engineering labor force , African Americans hold 5.7 jobs manned by women. This was an

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increase of only 0.1 from a further 20 times. The story was more promising for Asian and Hispanic women. In 2015, Asian women held 22.9 knowledge and engineering jobs, a significant increase from the 9.8 share they had in 1995. Hispanic women were 6.4 in 2015 and 2.9 in 1995. Meanwhile, white women held 62.9 shares. in 2015, down from 81.3 in 1995. The same National Science Foundation analysis showed that women in the field earned a modest $1,000 annually, as opposed to men's average pay of $1,000. African Americans earned a general average of $1,000 overall. , while whites normally earned $1,000. Women mathematicians in India became famous only in the twentieth century, and there are still many of them! Nevertheless, the list is expanding. Nevertheless, many women made advances in mathematics from the nineteenth century to the early twentieth century. Taxila was the first center of advanced knowledge in India, dating back to at least the fifth century BCE, and its status as a university is controversial. Nalanda was the world's leading university education system in the contemporary sense of the word. Mathematics, problem-solving and numbers are dialects that only men understand. Still, the vast majority of ancient and modern women have fared better in mathematics, exhibiting false biases. Individuals have prepared papers, prepared formulas, and conducted various good drafts. Anyway, although math people started gaining height in the twentieth century, the table goes up. Mathematics has traditionally been used to maintain simulation and statistics to establish propositions and to plan practical tests. Wherever numbers or symbols are modified, fine connections promote manipulation. Seeing the emergence and functioning of digital computer systems, many investigative fields of science can now inspire vast amounts of information – mortal genome design being an example – as well as establish this data to reward applied information. There is a demand for new styles. , because the situation may depend on quantitative methods. Somerville, a mathematician, wrote in his autobiography, "British laws are against women." In 1880, a Cambridge University student was placed eighth in the Mathematical Tripos, but Charlotte Angus Scott was not allowed to graduate. He was not actually given the title of the eighth Wrangler, which a person with the same number of points would have entered. Nevertheless, Manish's scholars expressed their condolences for the injustice in this situation, and she cited it in her autobiography and a book on women mathematicians. The remark that mathematics is not for women was first falsified by two Indian mathematicians Shakuntala Devi (from Karnataka, India) and Raman Parimala (from Tamil Nadu, India) as women, to eradicate casteism and sexism from Indian

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culture and society. duty was earned. , From Karnataka, India, Shakuntala Devi, called mortal-computer and achieved the Guinness Record for computation, was corrected for her book "The World of Homosexuals", the first published scholarly study of "Homosexuality in India". was the study. (Shakuntala Devi)

STATUS OF WOMEN IN MATHEMATICS

The typical time of mathematicians in the United States since the 20th century is 77.7, and in India 79. The latter piece of the 20th century may be the time for an evaluation of women mathematicians in India. Essentially all 20th-century mathematicians in the United States (Chief AU) experienced a place close to one of those in the middle of the go-to: tendencies, abuse, confusion, religion and character in the gatekeeper business and to India. , no such data is open. Despite this, it appears that Sujata Ramdorai and Neena Gupta have expressed their views on having an affair.

Progress in supporting women consistently inspires them to choose their bearing. Next, the passion required to promote women's support is to guarantee women's safety, save a young woman, and open her mouth to protest imbalance. Let the woman be free. Visit with women and young children, provide them with guidance, clinical ideas, and the environment is sensationally huge to support women. Allow young women to use PDAs. Fulfilling the young man's marriage and enforcing peculiar rules against assault are some of the issues that 'should be aimed at young women and their families'. Give women's work the respect it deserves.

The spike really centers around the blowout, and inevitably more advances should be taken, in order for women to seek out non-vintage-style occupations. The various obvious female mathematicians highlighted in this part had an understanding of the light effect. Some established an energy for mathematics. To increase such an impact among women, more women-based gifts and rewards for the best performers in mathematics at the school level should be progressed. People can show the meaning of mathematics to a more energetic age, prompting them to seek it as a life-long interest. You will inculcate mathematical substance and strategy essential to influencing cutting-edge interest in mathematics. Instead of

proceeding with standard assessments, continuous mathematical assignments can be given at the school level to look for potential new hobbies.

Some experts have observed that planning women usually helps them through their secret for a long time at home and makes a huge difference in school. With the obvious help of gatekeepers and trainers, the speculative stakes can look much better. In India, the issue is troubling about the amicable rules that young women have child weight. The young women feel that her marriage has improved very rapidly. Here, of course the field scheme is fundamentally vast for mathematicians under 40. The undeniable response is family responsibilities. However, if a man who marries a potential woman offers her full-scale viability, then this is what they are chasing to gain; Such restrictions would give him a different bunch.

Women are constantly prepared for different tasks at the same time; One can see that the regular family works while they play. People should enable such inherent practical limitations to science. A social class with a high level of mathematical and computational cutoff marks never misfires and rules the world, precisely as well as morally.

There have been positive changes within the Mathematical Master affiliation. The Relationship for Women in Math (AWM), coined around 1970 under the major work of Mary Dall, has joined women mathematicians, it may very well be said that the neighborhood provided a medium through which their Tendency and thinking can be evaluated. Women currently serve as editors, trained professionals and people on the board, and are on various early notification teams of the American Mathematical Society (AMS), the Master of Assessment Mathematicians Association. They also visit various sheets of the Essential Social Affairs People and Mathematical Relations of America (MAA) list of editors, subject matter experts and lead representatives. Without a doubt, currently Dorothy Bernstein is the president-elect of the MAA and Julia Robinson is the VP of AMS.

What a wonderful expansion the women speakers invited to the annual, summer and special festivals of both the AMS and MAA. All around, I think, these advances are the delayed results of AWM's undertakings. It has been 10 years since the efforts made towards creating and utilizing the coherent and clear gifts of women and ethnic minorities. A specific interest for women and minority women scientists is considering the need for potential owners to obtain government resources to meet the regulatory system regarding minorities in the public eye's needs.

The real vocation of a female mathematician is to state that he would have a great deal of respect for using a perfectly skilled female mathematician, yet may not see one as one. In any case, during the period 1966–70, women allowed the numbers to rearrange, claiming seven percent of doctorates, 25% of bosses', and 36 percent of slackers. Furthermore, the work of mathematicians had about the most astonishing progress speed of any science. This and I came as a big shock, while the mention of "deserving" women not being pardoned comes across as a system that "less qualified" women are chosen. It helps me review the 1973 Driving Assembly of Science Public Preparedness, where I sat down to focus on the fight that they couldn't find a "worthy" minority to relationship on various sheets and sheets. I was stoked (as were various people) when Percy Julian pointed out that he was not a man from the public complex of science (he was thus chosen to endorse).

Just at that time only one person in the group (a mathematician) was found "eligible" for election. After 1976 a female mathematician was selected for recruitment.

Conclusion

Exactly when we set about the task of choosing the authentic openness of female mathematicians and increasing that savings, we are obliged to reconcile our endeavors toward establishing comparable entry routes into business, yet each The Enlightenment level, as well as the Master level, and perhaps goes as a stumbling block for women entering the sciences towards taking out the sexism that interfaces through The choice to keep going assumes additional significance when we consider the higher supervision rates for women than men at various levels of the mathematical system, and that work decisions may actually be made with contempt for subjects requiring the use of mathematics are limited.

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An Attendance System using face Recognition Through Mathematics

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Abstract

Attendance is a vital aspect of learning in every educational institution. Attendance taking in every class is a routine activity in institutions and organizations. The traditional ways of taking attendance by signing papers or calling names in the class are very time-consuming and doubtful. The management of attendance also leads to an immense problem if administered manually. In this digital age, there must be a change from these traditional ways to accelerate and provide time efficiency.

This paper intends to develop an attendance system using Face Recognition AI that can be used to record attendance from everyone present in an organization. It will use the camera for capturing the faces of the students individually, recognize them, and update the database. The Face Geometry Algorithm attributes and machine learning-based methods will be applied. Extraction and pre-processing of the face region will be performed for advanced processing. With this algorithm, the system will recognize a person's face and record attendance for making it faster and more efficient. Several mathematical algorithms will also be used for the development of the system.

Key Words: Attendance, Face Recognition, Face Geometry, Artificial Intelligence, Machine Learning.

Introduction

Attendance is an essential aspect of the learning process in educational institutions. By attending classes, students are able to get beneficial information from the teacher and improve knowledge and understanding of a particular field.

The most common attendance records in most organizations are still manual. Currently, there are two common ways to record attendance: Teachers call students one by one and record attendance on paper, or Students sign attendance on their own. Using the traditional method of taking attendance in the classroom leads to time mismanagement, human error, data loss, a lot of paperwork, incorrect number of entries, and inconsistency in data entry. Moreover, it can be easily manipulated. An automatic attendance system by face recognition using machine learning will be embraced in this paper. This system will eliminate manual intake of attendance and will be more efficient.

From security to law enforcement, from airports to police stations, from social media to adhaar cards, facial recognition is a way of identifying an individual using their face. It uses biometrics to map facial features and can identify people in photos, videos, or real-time. It is one of the most intensively studied technologies in computer vision, with constant approaches and encouraging results.

Face recognition technology is more than 50 years old and was started by a research team in the 1960s. The team was led by Woodrow W Bledsoe to conduct experiments for checking whether 'programming computers' could recognize human faces.

The team used a fundamental scanner to map the hairline, eyes, and nose of a person. The task of the computer was to find matches but it wasn't successful. Then after years of research, finally there came a 3D face recognition system. In this type of machine learning model finds patterns in image data. The working procedure involves face detection, face

analysis, image conversion and finally matching the image with the database. Facial recognition is a logical and systematic verification system. It is faster, more convenient, and more reliable when compared to other biometric technologies like fingerprints, retina scans, voice recognition, and palm or finger vein patterns.

Keeping these features in mind, this paper intends to use face recognition technology to introduce an improved attendance system.

Review of related work

This review aims to analyze the results available through the distinguished authors associated with the area of this study. The introduction of a lecture attendance system using a novel technique named continuous monitoring and automatic student attendance marked using the camera, such that it captures the photo of each student in the class was conducted by [1]. The system architecture is simplified using a double camera properly attached to all the classes. One of the cameras captures the student's image while the other is a sensor camera used for students seated in the class [2]. It will capture the image of each student and compare the image, and faces in the database for the perfection of attendance. Real-time computing vision algorithms in AAMS were introduced by [3]. Face detection is an application that recognizes human faces in digital images. The digital image is self-possessed of picture elements in the form of pixel values. It is an application that is designed for computer vision technology. Automatic Attendance System which uses the Facial Recognition Method [4]. Deep face recognition is a type of face detection. Finally, this application will rectify all the problems. Class Attendance Auto-management based on Deep Learning", Improvements in Education, Humanities and Social Science Researches [5] Instance-based learning is a machine learning algorithm. This approach uses several applications like human-computer interaction, automatic gate control, and video monitoring system. Face recognition technology using a binary histogram pattern Haar cascade and distance-based approach which recorded the attendance of the individual students in the class and converts the attendance into a spreadsheet. Algorithm Mathematics and Computer Science provide an illustration of face images in facial recognition. The first method is to survey the existing algorithm which is used to reduce the storage capacity for the instance-based algorithm. And the second method is to propose six reducing algorithms. Counterpart Approach to Attendance and Feedback System using Machine Learning Technique [6]. Face recognition is used in the second research publication, "Face Recognition System Based Attendance Marking System" (SenthamilSelvi, Chitrakala, Antony Jenitha, 2014), to overcome prior system challenges [7]. According to a research journal "RFID-based Student Attendance System" (Hussain, Dugar, Deka, Hannan, 2014), the proposed solution is almost identical to the first research journal in which RFID technology was used to enhance the adult attendance program. During this process, the tag and the student are also used as a way to track the presence of students [8]. The difference between the original journals that is where the information for the participants will be available through the website. Provides very easy-to-retrieve information. Also, this method is not perfect as it is not portable, because the RFID reader can work only when it is connected to a PC. A real-time computing vision algorithm is a non-intrusive system installed with a camera that snaps any image present in the classroom and compares the extracted faces from the image of the camera in the system. Moreover, machine learning algorithms are used for computer vision, and Haar Classifier is used for training images captured by the camera. Finally, for subtraction consideration of the image, the captured faces will be converted into grayscale and transferred to the database on the server later for processing.

Research Methodology

In the Artificial Intelligence field, CV (Computer Vision) is one of the most impressive and demanding tasks. CV functions as a bridge between software and visualizations. It allows the software to understand and learn about the visualizations in the surroundings. Nowadays, various packages are available for machine learning and computer vision. OpenCV is an open-source library supported by several programming languages and runs on most of the available platforms. The face recognition technology in the attendance system proposed in this paper can be implemented by using OpenCV and Python. The process will start with the camera capturing the faces of the students. Then it will recognize each student and update the database. Algorithms for face detection will be used. Face geometry and machine learning-based methods are the proposed algorithms for face detection. Processes of extraction, resizing, and equalization will be conducted for advanced processing. The proposed system can be designed by using platforms like Google Colab, Jupyter, or Visual Studio Code for the front end and Microsoft SQL (Data Manipulating Language) for the back end. The libraries OpenCV, dlib, and Face_Recognition will be used for the execution. Several mathematical models of face recognition will also be used. They will be processed during data generation, face analysis, and image classification. If an image needs recognition, machine learning algorithms check the differences between the image and each of its components by representing them as a matrix. To improve the process it is much better if applied principal component analysis and the differences are calculated from the 'transformed' matrix. Most of the algorithms in face recognition are categorized into two major groups: feature-based and image-based algorithms. Geometric features of the face like the distance between the eyes or the size of the eyes are explored and represented by feature-based methods. The Pythagorean theorem is also used to calculate the distance of the human figure and represent the face in pixels. A Lens calculator tool can be used in determining the dimensions of the image captured by the camera.

Approaches

The leading methods for face recognition are Geometric (feature-based) and photometric (view based).
Recognition algorithms are categorized into two main
modes:
1. Geometrics:
This is an approach to geometrical relationships and facial landmarks, the spatial outline of facial structures. The face is categorized based on several geometrical angles and distances among features by locating the core geometrical structures of the face as the nose, mouth, and eyes.
2. Photometric stereos:
Several images are captured under different lighting circumstances to recover the form of any object. The shape of the recovered object is defined by a gradient map with an array of the surface normal.
 Some Common recognition algorithms include:
1. Linear Discriminate Analysis;
2. Elastic Bunch Graph Matching;
3. Fisher-face algorithm;
4. Principal Component Analysis via Eigen-faces (PCA).
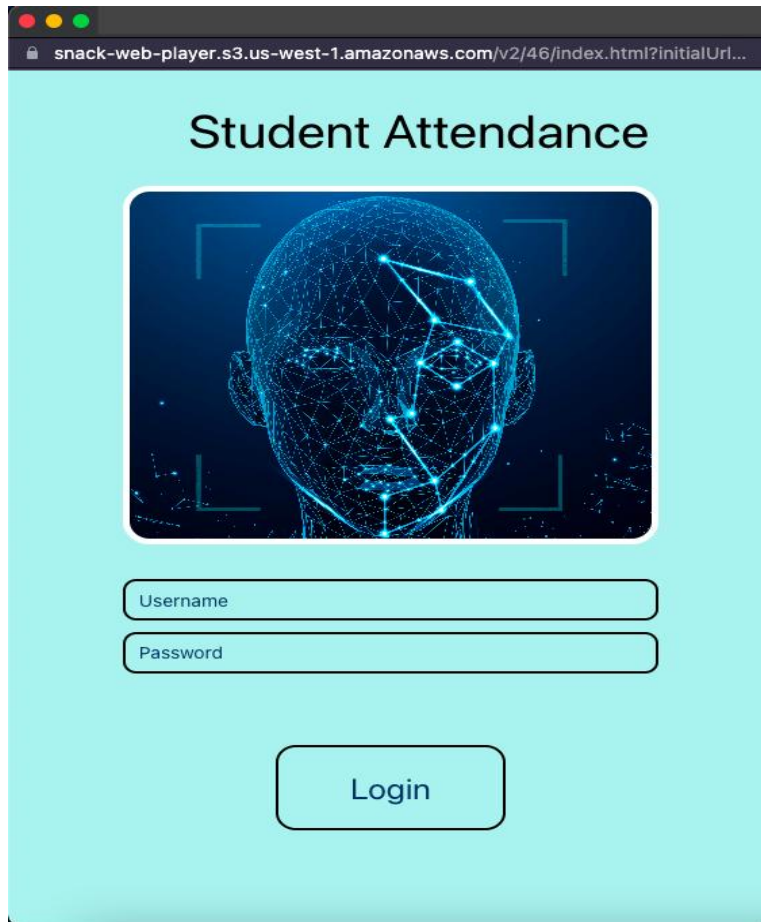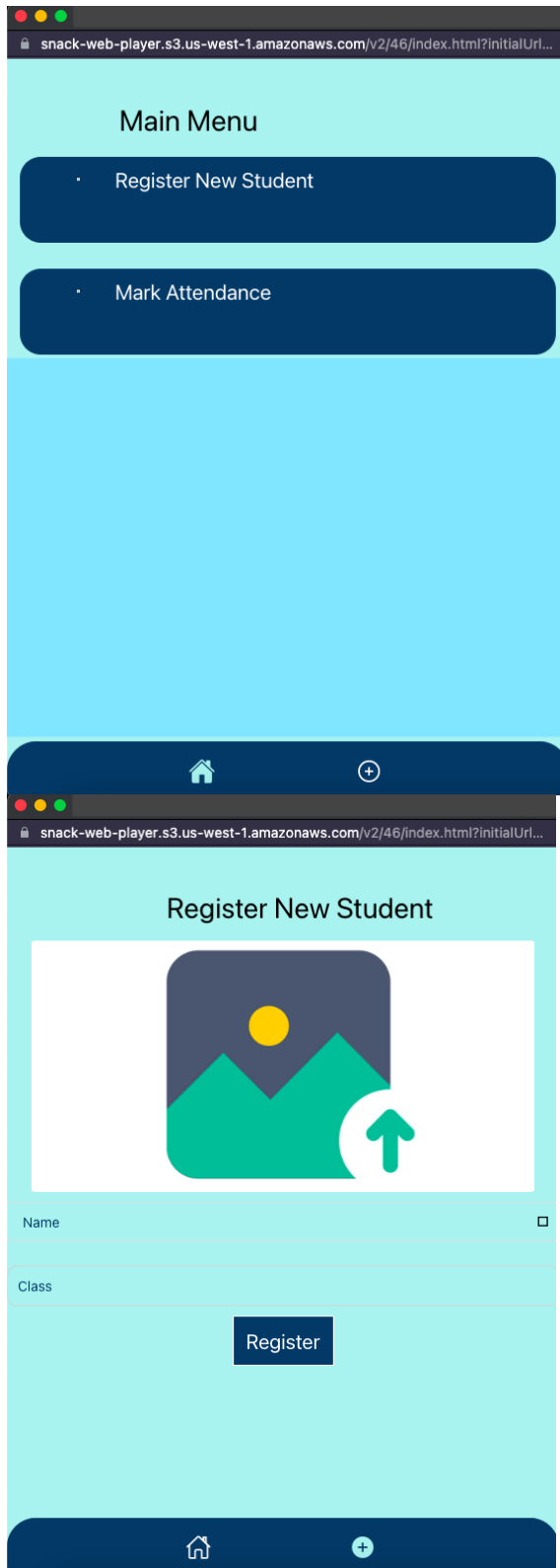
Why facial recognition over other biometrics?

This paper prefers the use of facial recognition over other biometrics due to the following reasons:

1. No physical interaction by the user is required.

2. It is accurate

3. It permits high enrolment and
verification rates.
4. Expert is not demanded to interpret the comparison
result.
5. No requirement for additional devices, existing hardware can be used.
6. It allows you to perform passive identification in many environments.

Components of Face Recognition Systems

The components used in the development of the proposed system will be Artificial intelligence, Computer vision, Object recognition, Machine learning, Learning paradigms, Supervised learning, and learning by classification. These components will help recognize the key features of the face. The main facial recognition methods will be feature analysis, neural networks, eigenfaces, and automatic face processing.

Algorithm for Facial Recognition

Algorithm 1
1. Student's Picture configuration;
2. Algorithm Application of Face recognition;
3. Extraction of the face recognition based;
4. Resizing image and converting it for normalizing;
5. Correction of above normalization;
6. Post-processing.

Algorithm 2
1. Student's Picture configuration;
2. Application of face recognition Algorithm;
3. Extraction from 2 above;
4. Conversion to 100x100 i.e. Apply pre-processing;
5. Correction of the above;
6. Post-processing.

Conclusion

Human face recognition is a way of authentication used in several areas. This paper proposes a facial recognition attendance system to reduce and gradually end the issues faced while taking and managing manual attendance. This system will be a procedure of recognizing students by their face biostatistics. It will be based on several computer technologies like AI, CV, HD monitoring, Machine learning, etc. Several mathematical algorithms will also be used for the development of the system.

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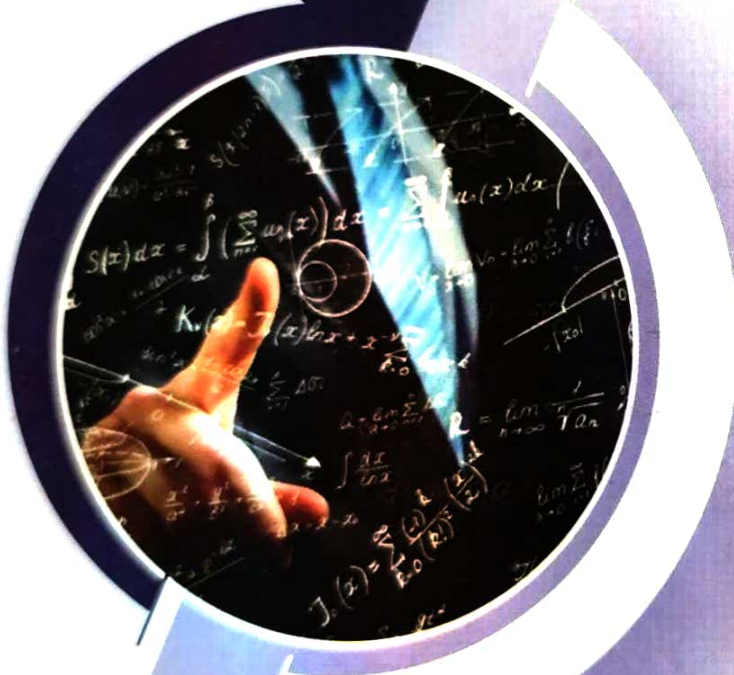
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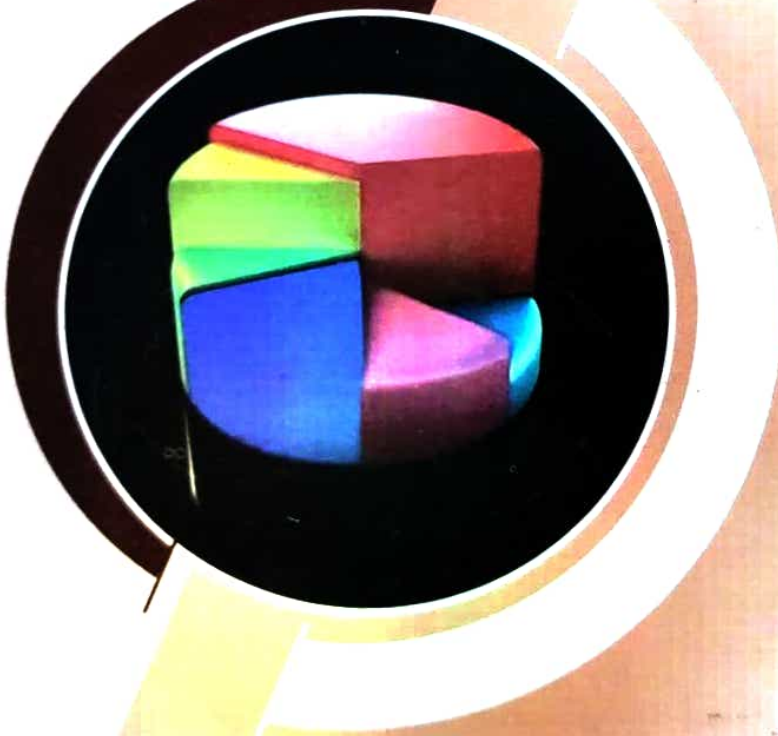
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