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OF ARTS AND SCIENCE FOR WOMEN

(Affiliated to Periyar University, Salem)
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CONFERENCE PROCEEDING

2nd International Conference on
COMPUTATIONAL MATHEMATICS AND STATISTICS (ICCMST - 2024)

Date : 30.09.2024

Organized by

DEPARTMENT OF MATHEMATICS

ISBN: 978 – 81 – 9784 – 267- 2

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TAMILNADU,INDIA.

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PRESIDENT MESSAGE

Mother G. Rajamani

"Computational Mathematics is the catalyst for innovation in the information age."

Dear Participants,

It is with great pleasure that I welcome you to the International Conference on Computational Mathematics and Statistics. This conference embodies our dedication to advancing knowledge and fostering collaboration in these critical fields.

As we gather to exchange ideas and explore the latest research, I encourage you to engage deeply with one another. The insights and innovations shared during this conference will undoubtedly illuminate the path forward in computational mathematics and its application to real-world problems.

Wishing you all a successful and inspiring conference!

Warm regards,
Mother G. Rajamani
President

SECRETARY MESSAGE

Rev.Sr. Dr. A Antony Maria Jansi

"The intersection of mathematics and computing has transformed the scientific landscape."

Dear Esteemed Guests and Participants,

Welcome to the International Conference on Computational Mathematics and Statistics. This event provides an exceptional opportunity for researchers, practitioners, and students to come together and delve into the fascinating world of mathematics and statistics.

I commend the Department of Mathematics for organizing this important conference aimed at advancing our understanding and application of computational techniques. May your discussions be enriching and may the connections you forge lead to future collaborations that propel our field forward.

Best wishes for a successful and impactful conference!

Sincerely
Sr. Dr. A Antony Maria Jansi,
Secretary

ADMINISTRATOR MESSAGE

Rev. Sr. T. Reetha Mary

On behalf of the Department of Mathematics at St. Joseph college. I am pleased to share this message to the International Conference on ***Computational Mathematics and Statistics.*** We are thrilled to host this gathering of esteemed researchers, practitioners, and students dedicated to advancing our field.

This conference will showcase cutting-edge research, foster collaboration, and provide opportunities for insightful discussions on the latest methodologies and applications in computational mathematics and statistics. I encourage you to actively engage in the sessions and connect with fellow attendees. I Congratulate the convener and organizers for their excellent work in conducting the conference.

Thank you for joining us in this exciting endeavor. Together, let's push the boundaries of knowledge in computational mathematics and statistics.

Best regards,
Sr. T.Reetha Mary ,
Administrator

MESSAGE FROM THE PRINCIPAL

Dr.A.Ameer Baig

Dear Distinguished Guests, Researchers, and Participants,

I am pleased to welcome you to the International Conference on Computational Mathematics and Statistics, hosted by the Department of Mathematics.

This conference aims to bring together experts from around the world to share their knowledge and research in the fields of computational mathematics and statistics. We have an exciting lineup of keynote speakers, technical sessions, and paper presentations that will showcase the latest advancements and innovations in these fields.

I congratulate the organizing committee for their dedication and hard work in making this conference a reality. I also appreciate the support of our faculty members, students, and staff in making this event successful. May this conference provide a platform for meaningful discussions, collaborations, and knowledge sharing that will advance the fields of computational mathematics and statistics.

Best regards,
Dr. A. Ameer Baig
Principal

Message from the Convener – ICCMST – 2024

Rev.Sr.A.ChellaRegina Mary

We are pleased to announce the publication of our book titled “Computational Mathematics and Statistics- (ICCMST-2024)." This book is a compilation of insightful articles by distinguished experts from various fields within mathematics and statistics, providing a comprehensive understanding of current trends that address contemporary challenges. The evolution of mathematical activities has impacted every domain, and this book delves into these emerging trends and their potential influence on the future of mathematical education. This theme reflects our on-going commitment to exploring and advancing the fields of computational techniques and statistical methodologies, which are critical to solving complex problems in today's world.

The conference events are designed to engage researchers, practitioners, professionals, and students in sharing their experiences, innovative ideas, and insights on recent developments and future directions in mathematics and statistics.

The success of this conference will inspire us to continue introducing new initiatives aimed at fostering innovation in these fields in the years to come. I extend my best wishes for the success of (ICCMST-2024).

As we move forward, I wish the organizing committee and all participants for their tireless efforts in planning and preparing for this significant event. May the conference be a resounding success, and may the knowledge shared continue to inspire and drive innovation.

Best Regards,

Rev.Sr.A.Chella Regina Mary
Head of the Department of Mathematics
Convener - ICCMST – 2024

ABOUT COLLEGE

St. Joseph College of Arts and Science for Women (Affiliated to the Periyar University, Salem), Pagalpatty, Omalur TK, Salem Dt. - 636304, Tamil Nadu is a Catholic Minority Institute, established in 2021, managed by Franciscan Sisters of St. Aloysius Gonzaga, Pondicherry. It is a women- religious congregation committed to the integral human development. The members of the congregation have been rendering their dedicated service in the fields of education, health care, and social welfare both in national and international spheres since 1775. The mission of the college is to educate the rural and marginalized sections of women and to transform themselves and society in Equality, Justice, and Peace. Presently the College offers B.A. English, B.Com (C.A), B.Sc. Computer Science, B.Sc. Physics, B.Sc. Mathematics, B.Com, BCA, B.A. History, M. com, and M.Sc Computer Science along with employable professional skill based development courses.

DEPARTMENT OF MATHEMATICS

The Department of Mathematics was established in the year 2021. The faculty members are well qualified, dedicated and experienced, providing quality education and opportunities for overall development of the students. The Department provides placement facilities and training to the students with excellent activity-based learning and audio – visual aids. The staff members of the department invariably focus on research and development activities besides regular teaching**.**

ABOUT ICCMST–2024

The International Conference on **— COMPUTATIONAL MATHEMATICS AND STATISTICS** is to confer a forum for the presentation of new advances, research results and to discuss the future trends in the fields of Mathematics and its applications. The conference includes keynote address and plenary sessions by experts and presentation of contributed papers.

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Rev.Sr.Dr. A. Antony Maria Amal FSAG , Secretary

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Dr. A. Jothie Baig , Principal

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Head, Department of Mathematics

CO-CONVENER

Rev.Sr. A. Sahaya Rusmi, FSAG
Assistant Professor / Mathematics

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Mrs. V. Jithya, Assistant Professor / Mathematics
Mrs. D. Indhumathi, Assistant Professor / Mathematics

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6.Dr. Sadhasivam, HOD, Govt.Arts College, Karuporam
7.Dr.S.Suresh,HOD, Department of Mathematics, Jeppiaar Institute of Technology, Kanchieepuram, Chennai.

EMINENT SPEAKERS

Dr. Ratnakar
Deputy Vice Chancellor,
Geovas University
Petaling Jaya, Selangor, Malaysia

Topic: "Quantum Mathematics"

Dr. S. Parthiban
Associate Professor
Department of Mathematics and Statistics,
School of Applied Sciences and Humanities,
Vignan's Foundation for Science, Technology and Research, (Deemed to be University)
Vadlamudi, Guntur District, Andhra Pradesh, India
Topic: "Test of Hypotheses, An Approach by Fuzzy Numbers"

Dr.K. Venkataramanan
Assistant Professor, School in charge
School of Basic Sciences, Tokshadhla University, Tiruvanam
Topic: "Applications of pure Mathematics in basic life"

ADDRESS FOR COMMUNICATIONS

Sr. A.Sahaya Rusmi
Co-Convener
Assistant Professor
Department of Mathematics

Cell: 9119789922

ST. JOSEPH COLLEGE
of Arts and Science for Women

(Affiliated to Periyar University)
Pagalpatty, Omalur (Tk.), Salem (Dt.) - 636 304.
Tamil Nadu, India.

DEPARTMENT OF MATHEMATICS

Cordially invites you for the

2nd International Conference on

"Computational Mathematics and Statistics"
(ICCMST -2024)

30 SEPTEMBER 2024

Time : 9.00am

Venue : Gonzaga Auditorium

sjciccmst2024@gmail.com

www.sjcsalem.edu.in

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CALL FOR PAPERS

Original papers are invited from academicians, research scholars and industrialists in the following areas and any related topics:

- Computational Mathematics
- Computational group theory
- Computational Topology
- Computational Statistics
- Analysis
- Cryptography
- Combinatorics
- Calculus
- Differential equation
- Data science and Machine Learning
- Computational number theory
- Computational Algebraic Geometry

CALL FOR ABSTRACT

Abstracts of your valuable research work paper as per the conference theme are invited from both online and offline mode. The abstract must be restricted to 300 – 500 words in the MS word format with 12 font size from Times New Roman style pattern. Send your paper through the official mail id provided in this invitation. Certificate will be provided to all registered participants. Best paper presentation will be honored and awarded.

IMPORTANT DATES

Last Date for Abstract Submission	: 15.09.2024
Last Date for Registration	: 15.09.2024
Acceptance of Notification	: 16.09.2024
Last Date for Full Paper submission	: 20.09.2024

The following departments could participate and present the papers at the conference.

- Statistics
- B.Sc. Computer Science
- B C A
- B.Com
- B.Com (CA)
- Physics
- Chemistry

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Scan here to get registration form

GENERAL INSTRUCTIONS

- ISBN : Abstracts will be published in the conference proceedings with ISBN.
- ISSN : Full - length articles will be published in the online journals with ISSN for an additional charge.
- All rights of publication of paper included in the conference shall rest with the conference organizers.

- Conference Kit, Lunch & Certificate will be provided for the registered participants.
- No T.A / D.A. will be provided.
- Spot Registration will also be accepted.

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Pagalpatty, Omalur (Taluk) Salem District – 636 304, Tamilnadu, India

Department of Mathematics

2nd International Conference On
"Computational Mathematics And Statistics" (ICCMST – 2024)

Programme Schedule

Date: 30 September 2024 **Venue**: Gonzaga Auditorium

Inauguration:	**9.30 am – 10.15 am**

Welcome Address:
Mrs.V. Nithya ,
Assistant Professor, Department of Mathematics
St. Joseph College of Arts & Science for Women, Pagalpatty
Salem – 636 304, Tamilnadu

Presidential Address:
Rev. Sr. Dr. A. Antony Maria Jansi, Secretary
St. Joseph College of Arts & Science for Women, Pagalpatty
Salem – 636 304, Tamilnadu

Blessings:
Rev. Sr. T. ReethaMary,Administrator
St. Joseph College of Arts & Science for Women, Pagalpatty
Salem – 636 304, Tamilnadu

Felicitation:
Dr. A. AmeerBaig, Principal
St. Joseph College of Arts & Science for Women, Pagalpatty
Salem – 636 304, Tamilnadu

Technical Session – I	**10.15 am – 11.00 am**

Introducing the Speaker :
Rev. Sr.A. Regina Mary,
HOD, Department of Mathematics & Convener
St. Joseph College of Arts & Science for Women, Pagalpatty
Salem – 636 304, Tamilnadu

Resource Person :
Dr. M.Ratnakar,
Deputy vice Chancellor,
Genovasi University, Malaysia.

.

Technical Session – II	11.00 am – 11.30 am

Introducing the Speaker:

Rev. Sr.A. Sahaya Rusmi ,
Assistant Professor, Department of Mathematics
St. Joseph College of Arts & Science for Women, Pagalpatty
Salem – 636 304, Tamilnadu

Resource Person:

Dr. S. Parthiban,
Associate Professor ,
Department of Mathematics & Statistics,
(Deemed to be University),**Andhra Pradesh.**

Tea Break	11.30 am – 11.45 am

Technical Session – III	11.50 am – 12.20 pm

Introducing the Speaker:

Mrs.V. Nithya ,
Assistant Professor, Department of Mathematics
St. Joseph College of Arts & Science for Women, Pagalpatty
Salem – 636 304, Tamilnadu

Resource Person:

Dr. K. Venkataramanan,
Assistant Professor,
School of Basic Science,
TakshashilaUniversity,Tindivanam

Oral Presentation	12.20 pm – 1.00 pm

Lunch Break	1.00 pm – 1.45 pm

Oral Presentation	1.45 pm – 2.45 pm

Valedictory Session	2.45 pm – 3.00 pm

Vote of Thanks 3.15pm

Mrs. G. Indhumathi ,
Assistant Professor, Department of Mathematics
St. Joseph College of Arts & Science for Women, Pagalpatty
Salem – 636 304, Tamilnadu

RESOURCE PERSON

Prof.Dr.Ratnakar D B
Deputy Vice Chancellor
Genovasi University, Petaling Jaya,
Selangor, Malaysia.
Email :dbratnakarimrf@gmail.com
Ph : +91 9533421234

Dear Esteemed Colleagues and Distinguished Guests,

It is with immense pleasure and admiration that I extend a heartfelt welcome to each of you at the 2nd International Conference on Computational Mathematics & Statistics. This gathering stands as a testament to the remarkable strides we have collectively made in this dynamic field and the boundless potential that lies ahead.

Congratulations are in order for all who have contributed to making this conference a reality. Your dedication, scholarly rigor, and innovative spirit have shaped this event into a cornerstone for advancing computational mathematics. Each presentation, discussion, and interaction is a reflection of the vibrant intellectual community that drives our field forward.

As we engage in the exchange of ideas, explore cutting-edge research, and collaborate on new methodologies, let us celebrate not only the achievements that have brought us here but also the future breakthroughs that await. Our collective efforts are charting new territories in theory and application, bridging gaps between abstract concepts and practical solutions.

May this conference inspire new perspectives, foster meaningful connections, and ignite passions that will lead to transformative advancements in our field. I congratulate the Organizing Committee of the Conference and St. Joseph College of Arts and Science for Women, Salem for organizing this Conference to celebrate the synergy of collaborative exploration.

Congratulations once again to all, and welcome to an event that promises to be as enlightening as it is exhilarating.

Warmest regards,
Prof.Dr.Ratnakar D B
Deputy Vice Chancellor, Genovasi University,
Petaling Jaya, Selangor, Malaysia.

RESOURCE PERSON

Dr. S. Parthiban, Ph.D., Associate Professor,
Department of Mathematics and Statistics,
School of Applied Sciences& Humanities,
Vignan's Foundation for Science, Technology & Research,
(Deemed to be University)
Vadlamudi, Guntur-522 213, Andhra Pradesh, India.
Email: drsp_sh@vignan.ac.in

MESSAGE

The quest for knowledge and wisdom have been from the beginning of time but those become valuable only when it is disseminated and applied to the benefit of humankind.

It gives me an immense pleasure that I have been one among the invited speakers of the 2nd International Conference on Computational Mathematics and Statistics (ICCMST-2024).

It is believed that ICCMST-2024will be a platform to gather and disseminate the latest knowledge in Computational Mathematics and Statistics. Academicians, Scientists, Researchers and Practitioners in the field of Computational Mathematics and Statistics will be able to share and discuss innovative findings and applications from their part.

With this platform,ICCMST-2024will embark on a whole process of making new discoveries and then transmitting them into real life applications which will be widely fruitful to the society and this is possible only with the people like all of you…!

I would like to cordially congratulate the organizing committee and every faculty member of the Department of Mathematics of St. Joseph College of Arts and Science for Women for their tremendous efforts in laying out this conference successfully.

Finally, I congratulate and felicitate all the participating delegates of this conference from various states and parts of the globe and also the management dignitaries ofSt. Joseph College of Arts and Science for Women, without whose support this event could not be materialized.

I wish the ICCMST-2024 all success…!

Dr. S. PARTHIBAN

RESOURCE PERSON

Dr.K.Venkataramanan
School in Charge
School of Basic Sciences
Takshashila University
Tindivanam.

Dear Esteemed Delegates and Organizers,

It is with great pleasure that I extend my heartfelt congratulations to St. Joseph College of Arts and Science for Women, Salem, on the occasion of the Second International Conference on Computational Mathematics and Statistics. This remarkable event underscores the institution's commitment to advancing the frontiers of knowledge in these critical fields.

In today's rapidly evolving world, the intersection of computational mathematics and statistics plays a pivotal role in solving complex problems and driving innovation across various sectors. By convening this conference, you are not only providing a platform for the exchange of cutting-edge research and ideas but also fostering a vibrant community of scholars, practitioners, and students who are dedicated to pushing the boundaries of our understanding.

The calibre of the papers, presentations, and discussions promised at this conference reflects the depth of expertise and passion within our global academic community. I am confident that the insights gained and the collaborations forged during this event will contribute significantly to the advancement of both theoretical and applied aspects of computational mathematics and statistics.

I commend St. Joseph College of Arts and Science for Women, Salem, for its outstanding effort in organizing such a prestigious event and for its continued dedication to academic excellence and research innovation. Your leadership in creating opportunities for intellectual growth and scholarly exchange is truly commendable.

Wishing you a successful and inspiring conference.

Warm regards,

Dr.K.Venkataramanan
School in Charge
School of Basic Sciences
Takshashila University
Tindivanam

ABSTRACT CONTENTS

10	**AP10**	QR FACTORIZATION: THEORY, ALGORITHMS, AND APPLICATIONS IN COMPUTATIONAL MATHEMATICS" **[1]Dr.A.MUGHIL [2]Ms. B. GOMATHI,**	10
11	**AP11**	GRAPH THEORY AND ENERGY CALCULATIONS IN TRAMADOL:A COMPUTATIONAL APPROACH **[1]Ms. S.RANJITHA [2]Ms. R.JYOTHIKA,** **[3]Mrs. R.LATHA**	11
12	**AP12**	EXPLORING LIMITS OF FUNCTIONS IN CALCULUS THROUGH PYTHON **[1]Mr.A.ISWARYA *[2]Ms.DHANUSHIYA NALLATHAMBI***	12
13	**AP13**	MANIPULATING AND ANALYSING INTUITIONISTIC FUZZY MATRICES IN PYTHON **[1]Mrs.G.Brindha [2]Mr.S.Elayaraja**	13
14	**AP14**	NORTH-WEST CORNER RULE FOR TRANSPORTATION PROBLEM WITH PYTHON TOOLS **[1]Mr. S.NAGARAJAN [2]Ms.J.HARINISRI** **[3]Ms.S.SRIMATHI**	14
15	**AP15**	SOLVING FUZZY TRANSPORTATION PROBLEMS USING PYTHON ***[1]Mr.R.MATHIVANAN M.Sc.,B.Ed.,*** ***[2]Mr.G.GOKUL***	15
16	**AP16**	SYMMETRY AND INVARIANT SOLUTIONS IN DIFFERENTIAL EQUATIONS **[1]Ms.A.Dharshana ,[2]Ms.P.Soundharya**	16
17	**AP17**	ESTIMATING MISSING VALUES IN A COMPLETE BLOCK DESIGN OF LATIN SQUARE DESIGN USING VARIABLE CONTROL CHARTS THROUGH RESPONSE SURFACE METHODOLOGY **S. Kokkilambigai[1] and M. Pachamuthu[2]**	17
18	**AP18**	THE COORDINATES OF THE CENTRE OF CURVATURE **[1]S.Subbulakshmi [2]Sr. A. Sahaya Rusmi Pappa**	18
19	**AP19**	EXPLORING BASIC CONCEPTS IN NUMBER THEORY AND THEIR PRACTICAL USES **[1]S. Gousi Mahalakshmi [2]V. Nithya**	19

20	**AP20**	TRIGONOMETRY **[1]G.Soundharaya [2]V. Nithya**	20
21	**AP21**	RING **[1]T. YUVANITHA [2]V. Nithya**	21
22	**AP22**	UNVEILING THE POWER OF DIFFERENTIAL EQUATIONS: REAL-WORLD APPLICATIONS **[1]K.Nayantharanisa [2]V. Nithya**	22
23	**AP23**	UNLOCKING THE POWER OF QUADRATIC EQUATIONS: SOLUTIONS AND APPLICATIONS **[1]M.Kaviya [2]V. Nithya**	23
24	**AP24**	DIFFIE-HELLMAN AND RSA METHOD IN CRYPTOGRAPHY ALGORITHM USING C PROGRAM TOOLS **[1]Mr. S.PALANIAPPAN [2]Mr. P.HARIHARAN**	24
25	**AP25**	DIABETIC PREDICTION USING MACHINE LEARNING ALGORITHM **Dr.S.Bharathi[1], Sangeetha.R[2]**	25
26	**AP26**	A STATISTICAL ANALYSIS OF SYMMETRICAL EXPERIMENTS THROUGH RESPONSE SURFACE METHODOLOGY **S.Sona[1] and M. Pachamuthu[2]**	26
27	**AP27**	CALCULUS AND ANALYTICAL GEOMETRY **[1]E.Vishalini [2]V. Nithya**	27
28	**AP28**	**VECTOR CALCULUS** **[1]Y.ReniNambikkai, [2]V. Nithya**	28
29	**AP29**	INVERSE GAMMA DISTRIBUTION-BASED DEWMA CONTROL CHART FOR PROCESS MONITORING **[1]CHANDRALEKHA. I, [2]SHALINI.K**	29
30	**AP30**	IMPLICATIONS OF MODELLING MORTALITY WITH TIME-VARYING EFFECTS IN SURVIVAL ANALYSIS OF HEART FAILURE PATIENTS **S Vijayan[1]and S Kavitha[2*]**	30

53	**AP53**	NANO SOFT TOPOLOGICAL SPACE, NEUTROSOPHIC NANO CLOSED SETS. **S.KrishnaJayanthi**	53
54	**AP54**	FRACTIONAL-ORDER COMPLEX-VALUED NEURAL NETWORKS WITH LEAKAGE AND DISCONTINUOUS DELAYS: STABILITY ANALYSIS **M. Suresh^{a}, R. Samidurai^{a}**	54
55	**AP55**	ANALYSIS OF BOTH DISCRETE AND LEAKAGE TIME VARYING IN FRACTIONAL-ORDER COMPLEX-VALUED BIDIRECTIONAL ASSOCIATIVE MEMORY NEURAL NETWORK STABILITY **M. Yazhini^{a}, R. Samidurai^{a}**	55
56	**AP56**	A NEW TOPOLOGICAL OPERATOR OVER TEMPORAL NEUTROSOPHIC FUZZY SETS **S. Sumathi[1] and K. Rajesh[2]**	56
57	**AP57**	PARAMETRIC AND BOUNDED VARIABLES LINEAR PROGRAMMING PROBLEMS IN OPERATIONS RESEARCH **PRATEEKSHA S K**	57
58	**AP58**	VERTEX COLORING IN FUZZY GRAPH **RAMYAKRISHNAN K**	58
59	**AP59**	EAR DECOMPOSITION IN GRAPH **DIVETHA.M**	59
60	**AP60**	FIBONACCI AND TRIBONACCI NUMBERS **SANTHIYA.S**	60
61	**AP61**	A STUDY ON CAYLEY GRAPH **S. GOKULAPRIYA**	61
62	**AP62**	PRIME NUMBERS IN CRYPTOGRAPHY **SANDHIYA.S**	62
63	**AP63**	NON-HOMOGENEOUS PARABOLIC PARTIAL DIFFERENTIAL EQUATIONS **TAMIL AZAHGI V**	63

2nd ONE DAY INTERNATIONAL CONFERENCE ON
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AP01

PYTHAGOREAN FUZZY SET'S - MAX NORM AND SQUARE-MAX NORM

Bhavani.S[aa]*AssistantProfessor, Department of Mathematics, Rajalakshmi Engineering College, Chennai - 602 105,Tamilnadu, India.*
[a]*sbhavanivtmt@gmail.com*

ABSTRACT

As an expansion of intuitionistic fuzzy sets, Pythagorean fuzzy sets (PFS) are better at communicating and overseeing vulnerability in dubious conditions. This paper presents two sorts of Pythagorean fuzzy set standards: the maximum standard and the square-max standard. Various properties are additionally investigated. It is as yet muddled how to precisely evaluate the maximum standard and square-max standard between the Pythagorean fuzzy sets in Pythagorean fuzzy sets (PFSs) hypothesis. To tackle this issue, we presented deciding the square-endlessly max standards between the Pythagorean fuzzy set in this paper. Then, mathematical models are given to show the practicality and sensibility of the Pythagorean fuzzy set's maximum standard and square-max standard.

Keywords:Pythagorean fuzzy sets, max norm and square-max

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AP02

RECTIFYING INSPECTION FOR DOUBLE SAMPLING PLANS WITH FUZZY LOGIC UNDER ZERO-INFLATED POISSON DISTRIBUTION USING ANALYSIS IN PYTHON

Kavithanjali S[1], Sheik Abdullah A*[2]

PG and Research Department of Statistics, Salem Sowdeswari college, Salem-636 010, Tamil Nadu, India

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ABSTRACT

Acceptance sampling is a statistical quality control technique used in manufacturing to determine whether to accept or reject a batch of products based on the number of defects obtain in a sample. Among the various sampling plans, the double sampling plan more effective because it often delivers more reliable results in selecting quality lots than other plans. In most of the real life situation, it is not easy found the product as strictly defective or non-defective. In some situation, quality of the product can be classified several types which are expressed as good, almost good, bad, not so bad and so on. This is causes fuzzy logic comes into play. Fuzzy set theory is most powerful mathematical tool, it can deal incomplete and imprecise information. In this research double sampling plans(DSP), are determined when non-conformities are treated as fuzzy number and using Zero-Inflated Poisson (ZIP) distribution to model these ambiguities. It analyse, the effectiveness of these sampling plans by comparing vital metrics such as Average Outgoing Quality (AOQ) and Average Total Inspection (ATI) using both fuzzy and crispenvironments. These findings are appraised as both numerically and graphically, showing that whether the process quality is either extremely good or very bad, the AOQ curve will be lower, the plan's able to effectively control product quality.

Keywords: ***Acceptance Double Sampling Plan, Fuzzy AOQ Curve, Fuzzy ATI curve, ZIP Distribution, Fuzzy Parameter.***

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP03

A STATISTICAL ANALYSIS OF MISSING DATA PATTERNS IN G-EFFICIENT DESIGN OPTIMIZED BY PRACTICAL SWARM OPTIMIZATION

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ABSTRACT

The study of robust missing observations has emerged as a crucial area in statistical research. In the context of Response Surface Methodology (*RSM*), a well-established and widely applied domain in experimental design, missing observations can complicate parameter estimation significantly. *RSM* is extensively used in designing experiments across various modern industrial and technological applications. In today's computer-driven era, many industrial sectors favor computer-generated designs over traditional classical designs. Despite its widespread use, there is limited research addressing the issue of missing data in computer-generated designs, with most existing studies focusing on traditional designs with missing data. Our research aims to bridge this gap by analyzing and evaluating G-optimal designs, which have been developed by researchers in recent years, specifically in the context of missing data. This study provides a comprehensive understanding of the robustness and efficiency of G-optimal designs when dealing with incomplete datasets. We conduct three types of analysis: First, we assess the average G efficiency of a design when data is missing, considering all subset design points within a specific factor of the design algorithm. Second, we use the minimax loss criterion to evaluate the maximum loss incurred due to a missing design point by examining a subset of all design points. Third, we assess the prediction performance using a Fraction of Design Space (*FDS*) plot, which illustrates the various distributions of the scaled prediction variance (*SPV*) values across the design space. We analyze the SPV scattering for the full *FDS* graph, comparing scenarios of missing versus non-missing data points to evaluate the minimum loss when a data point is missing, considering all design points in the evaluation. These research findings are crucial in advancing the industrial sector by significantly improving the comprehension and practical application of computer-generated designs utilizing the Particle Swarm Optimization (*PSO*) algorithm. This enhanced understanding facilitates the development of more efficient and effective optimization strategies, thereby driving innovation and productivity within various industrial applications.

Keywords: Optimal designs, Genetic Algorithm, Practical Swarm Optimization,Scaled Prediction Variance.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP04

RENEWABLE ENERGY USE, AGRICULTURAL PRODUCTIVITY, AND ECONOMIC EXPANSION IMPACT ON ENVIRONMENTAL SUSTAINABILITY IN INDIA: EMPIRICAL EVIDENCE FROM ARDL APPROACH

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ABSTRACT

This study aims to investigate the effects of agricultural productivity and the use of renewable energy on India's consumption-based emissions of carbon dioxide (CO_2) while taking economic expansion into consideration. This study applies the autoregressive distributed lag (ARDL) technique, dynamic-ordinary least square (DOLS), fully-modified ordinary least square (FMOLS), and gradual shift causality testing based on the paper's goal. The results unequivocally show that, whereas consumption-based CO2 emissions in India are lowered by agricultural productivity and the usage of renewable-energy, consumption-based CO_2 are raised by economic expansion. When using ARDL, DOLS, FMOLS and estimators, the gradual shift causality test yields consistent findings. This paper proposed regulatory policy instruments that are powerful enough to prevent environmental deterioration in order to promote sustainable development.

Keywords: carbon dioxide (CO2) emissions, agricultural productivity, economic expansion, renewable energy consumption, ARDL model, gradual shift causality

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP05

A STATISTICAL ANALYSIS OF AGRICULTURAL COMMODITIES PRICE IN INDIA USING MACHINE LEARNING APPROACH

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ABSTRACT

This research proposes an effective framework for crop price prediction based on machine learning to help farmers estimate their profit-loss in advance. Four functional components make up the suggested work: forecasting crop yield, estimating supply and demand, and forecasting crop pricing. The input datasets include the different field values, including yield, crop remaining at year's end, import, crop price, and demand. Crop yield predictions are made using a variety of time series-based methods, including exponential smoothing, autoregressive integrated moving average, and autoregressive moving average. Three factors are added together to determine the crop's supply: import values, residual values, and anticipated crop output. Due of its stronger link with a given year than with other factors, the demand for the crop is projected based solely on that year. The time series method, statistical methodologies, and machine learning techniques are some of the methods used to anticipate the crop price based on supply, demand, and year. The optimal model with the lowest root-mean-square error value is then identified by comparing these three price prediction methods. It is determined that, among the models tested in the suggested work, the decision tree regressor is the most effective at predicting crop price. Simulation findings demonstrate the relative advantage of the proposed work over the current methods in several dimensions.

Keywords: Agricultural Commodity; Crop Price; Prediction; Machine learning models; ARIMA.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP06

PRIME CORDIAL LABELING FOR TIGER – GOAT, DRAGON AND TUTTE-COXETER GRAPHS

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ABSTRACT:

In this paper, Prime Cordial Labeling for Tiger-Goat graph $T_G(P, Q)$, for the Dragon graph $T(C_r@P_m)$ when $r = n$ and $m = n + 1$, for the Tutte-Coxeter GraphTC_G are defined

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP07

OPTIMIZED NETWORK SLICING IN 5G/6G NETWORKS USING COMPLETE GRAPH MODELING

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ABSTRACT

The advent of 6G networks and the ongoing expansion of 5G technologies have underscored the need for innovative network management strategies. Network slicing has emerged as a pivotal technology, enabling the creation of multiple virtual networks that share the same physical infrastructure. This allows for tailored quality of service (QoS) requirements, supporting a diverse range of services, from low-latency applications to high-bandwidth demands.To optimize network slicing, we employ complete graph theory, representing network slices and resources as nodes within a complete graph. This enables the development of novel algorithms that optimize bandwidth allocation, minimize latency, and ensure fair resource distribution. Our approach introduces a comprehensive methodology designed to enhance the efficiency, scalability, and reliability of next-generation networks.

By modelling network slices as nodes within a complete graph, we can apply mathematical techniques to develop innovative algorithms that optimize resource allocation. These algorithms enable network operators to dynamically allocate resources in real-time, adapting to changes in user demand and service requirements. This research contributes to the growing body of work focused on optimizing network performance for emerging technologies, providing practical solutions to ensure future networks can support the evolving landscape of connectivity and communication.Our methodology offers a transformative shift in network design and operation, enabling network operators to optimize resources and meet diverse needs across industries. By leveraging complete graph theory, we provide a comprehensive solution for optimizing network slicing in 5G and 6G networks, ensuring efficient, scalable, and reliable network performance.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP08

ENHANCING DECISION-MAKING IN OPERATION RESEARCH VIA PYTHON

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ABSTRACT

This research paper explores the application of Python programming language in Operations Research (OR) to enhance decision-making. OR is a field of mathematics that deals with optimizing business processes and decision-making, and Python is a popular programming language used in various fields, including OR. The paper presents an algorithm that utilizes Python's optimization libraries, such as Scipy and Pyomo, to solve complex OR problems. The algorithm is designed to solve linear and nonlinear programming problems, and is demonstrated through a numerical example involving supply chain management.The paper highlights the benefits of using Python in OR, including its ease of use, flexibility, and extensibility. Python's optimization libraries are compared to other programming languages, such as MATLAB and C++, and are shown to be a viable alternative. The paper also discusses the potential applications of Python in OR, including data analysis, machine learning, and simulation modeling.The algorithm presented in the paper is tested on a set of benchmark problems and is shown to be effective in solving complex OR problems. The results of the example demonstrate the potential of Python in OR and highlight its potential to enhance decision-making. The paper concludes by highlighting the implications of the research for future work in OR and Python.Overall, this research paper demonstrates the potential of Python in OR and highlights its potential to enhance decision-making. The paper provides a comprehensive overview of the benefits and applications of Python in OR and presents an algorithm that utilizes Python's optimization libraries to solve complex OR problems. The paper is intended for researchers and practitioners in OR and Python, and provides a valuable contribution to the field.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP09

SYMMETRY AND INVARIANT SOLUTIONS IN DIFFERENTIAL EQUATIONS

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ABSTRACT

This study investigates how symmetry and invariant solutions influence differential equations. Symmetry involves the invariance of differential equations under transformations such as rotations, translations, or scaling. Identifying these symmetries is essential for simplifying complex equations by reducing them to more manageable forms. This simplification facilitates the derivation of invariant solutions, which remain unchanged under specific transformations, thus easing the solving process.Key techniques in this field include Lie group analysis and symmetry reduction. Lie group analysis identifies symmetries within differential equations, while symmetry reduction applies these symmetries to minimize the number of independent variables or equations. These approaches aid in discovering exact solutions and optimizing numerical computations. By leveraging symmetries, deeper insights into the behavior of differential equations can be gained, leading to more efficient solutions. Overall, the study of symmetry and invariant solutions provides crucial tools for analyzing and solving differential equations, with broad applications in various scientific and engineering disciplines.

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(ICCMST–2024)

AP10

QR Factorization: Theory, Algorithms, and Applications in Computational Mathematics"

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ABSTRACT

QR factorization is a fundamental technique in computational mathematics used to decompose a matrix into the product of an orthogonal matrix Q and an upper triangular matrix R . This decomposition plays a crucial role in solving linear systems, least squares problems, eigenvalue computations, and various matrix decompositions. Theoretical foundations of QR factorization lie in linear algebra, leveraging properties of orthogonality and triangularity, ensuring numerical stability and efficiency in computations. Several algorithms, including the Gram-Schmidt process, Householder reflections, and Givens rotations, have been developed for QR factorization, each with distinct advantages in terms of computational complexity and numerical accuracy. The choice of algorithm often depends on the application context, such as dense or sparse matrices, real-time computations, or high-dimensional systems. Applications of QR factorization span a wide range of fields, including signal processing, control theory, data fitting, and machine learning, where it facilitates the efficient solution of least squares problems and is integral to algorithms like principal component analysis (PCA) and singular value decomposition (SVD). Advances in parallel computing and high-performance numerical methods have further expanded the applicability of QR factorization in large-scale computational problems. This work reviews the theoretical underpinnings, algorithmic developments, and diverse applications of QR factorization in modern computational mathematics.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP11

GRAPH THEORY AND ENERGY CALCULATIONS IN TRAMADOL:A COMPUTATIONAL APPROACH

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ABSTRACT

This paper utilizes graph theory to examine the molecular structure of Tramadol, a widely used pain-relief medication. In this approach, the molecule is represented as a graph, where atoms serve as vertices and bonds as edges. This representation allows the use of adjacency, Seidel, and distance matrices to compute various energy metrics, providing deeper insights into the structural properties of the molecule. These matrices offer a systematic approach to understanding the relationships between atoms and the overall connectivity within the molecule.

The adjacency matrix is constructed to capture direct connections between atoms, highlighting how different parts of the molecule are linked. The Seidel matrix, derived from the adjacency matrix, inverts the connections between atoms and sets diagonal elements to zero, providing a different perspective on molecular structure. The distance matrix represents the shortest path between atoms, helping to analyze the spatial arrangement within the molecule. From these matrices, the graph energy, Seidel energy, and distance energy are computed by calculating the eigenvalues and summing their absolute values, which shed light on the molecule's stability and spatial configuration.

A Python-based computational approach is employed to efficiently calculate these energy metrics. Libraries such as NumPy and SciPy are used to handle matrix operations and eigenvalue computations. This ensures that the analysis is computationally feasible and accurate, even for complex molecular structures. By applying graph theory and computational methods, valuable insights are gained into Tramadol's molecular behavior and structural characteristics. This framework can be extended to analyze other molecular structures, making it a versatile tool for chemical and pharmaceutical research. Graph theory provides a powerful way to model and explore complex molecules through modern computational techniques.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
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(ICCMST–2024)

AP12

EXPLORING LIMITS OF FUNCTIONS IN CALCULUS THROUGH PYTHON

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ABSTRACT

This study delves into the of limits in calculus, which is essential for understanding derivatives and integrals. The focus is on harnessing Python's capabilities as a computational tool for analyzing and solving limit problems, providing a practical application of calculus. By leveraging symbolic computation libraries, particularly SymPy, the paper introduces an algorithm that automates the process of finding limits. SymPy, a Python library designed for symbolic mathematics, enables users to manipulate mathematical expressions algebraically, making it ideal for solving limits. The algorithm is designed to work with various functions, including polynomial, rational, trigonometric, exponential, and logarithmic functions.This approach creates a computational framework that enhances both learning and teaching of calculus by making abstract concepts more accessible and concrete through computational methods. The paper presents several examples demonstrating how Python can be applied to real-world limit problems, providing valuable insights for educators and students. By utilizing Python, the process of calculating limits is simplified, reducing manual errors and making complex problems more manageable.The results of the study showcase Python's effectiveness in computing limits, illustrating its role as a bridge between theoretical calculus and computational methods. This makes Python an invaluable tool in modern calculus education and research. The paper highlights the potential of Python to revolutionize the way calculus is taught and learned, making it more accessible and engaging for students. By leveraging Python's capabilities, educators can create interactive and dynamic learning experiences that foster a deeper understanding of calculus concepts. Overall, the study demonstrates the power of Python in calculus education and research, opening up new possibilities for exploration and discovery.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP13

MANIPULATING AND ANALYSING INTUITIONISTIC FUZZY MATRICES IN PYTHON

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ABSTRACT

In this paper, Intuitionistic fuzzy matrices (IFMs) enhance typical fuzzy matrices by including membership, non-membership, and hesitation degrees, allowing for a more nuanced representation of uncertainty and imprecise data. Unlike ordinary fuzzy matrices, which only consider the degree to which an element belongs to a set, IFMs can also reflect the degree to which an element does not belong as well as the degree of hesitation or indeterminacy. This adaptability makes intuitionistic fuzzy matrices extremely valuable in fields such as decision-making, pattern recognition, image processing, and others where incomplete or unclear input is common. This paper investigates the mathematical features and operations of intuitionistic fuzzy matrices with Python, focussing on addition, multiplication, scalar transformations, and other matrix manipulations. Python, with its strong modules like as NumPy and Pandas, provides an efficient and adaptable framework for managing and analysing IFM data. These libraries give the tools required to implement simple and sophisticated operations on intuitionistic fuzzy matrices, guaranteeing that both theoretical and practical aspects of matrix operations are investigated. The paper looks at essential features of IFMs such transitivity, reflexivity, idempotence, and orthogonality, which are important for understanding how these matrices behave in real-world situations. The transitivity quality is very significant in decision-making procedures where preferences must be evaluated and aggregated. Similarly, reflexivity and symmetry aid in the measurement of object relationships in pattern recognition and similarity assessments. Python's capacity to handle big datasets, together with its matrix operation skills, enables extensive analysis and visualisation of IFMs under different transformations. The use of Python not only increases the computational efficiency of working with intuitionistic fuzzy matrices, but it also helps to visualise how the matrices behave under changing situations, making it easier to grasp the doubt or reluctance indicated in data.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP14

NORTH-WEST CORNER RULE FOR TRANSPORTATION PROBLEM WITH PYTHON TOOLS

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ABSTRACT

The North-West Corner Rule (NWCR) is a well-known heuristic used in solving transportation problems, which involve determining how to efficiently allocate goods from several supply sources to various demand destinations while minimizing the transportation costs. In such problems, the goal is to find an initial basic feasible solution (a starting point for further optimization methods) that satisfies both supply and demand constraints.The NWCR gets its name from the fact that the solution process starts in the "**north-west**" (top-left) corner of a cost matrix, where each row represents a supply source, and each column represents a demand destination. The rule proceeds by allocating as much as possible to the current cell (either until the supply or demand is exhausted) and then moving either right or down to the next cell, continuing the process until the supply and demand values are satisfied.In this paper, the NWCR algorithm is detailed along with a step-by-step explanation of how the rule works. The process begins by selecting the top-left corner of the matrix and proceeds with allocations based on minimum supply or demand, adjusting the matrix iteratively. The resulting allocation often provides a near-optimal solution, although further refinement may be needed through their methods, such as the stepping-stone method. Additionally, the paper presents a Python implementation of the NWCR, which automates the solution process and practical application of the algorithm. The code efficiently handles the allocation process and presents the results for a sample transportation problem, clearly showing how the method works in practice. While the NWCR may not always guarantee the absolute minimum cost, it offers a fast and straightforward approach for finding an initial feasible solution, which can be refined later if necessary.Thus, the abstract summarizes a discussion of the North-West Corner Rule, its application to transportation problems, and the implementation of the algorithm in Python, supported by a numerical example.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP15

SOLVING FUZZY TRANSPORTATION PROBLEMS USING PYTHON

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ABSTRACT

This study addresses the Two-Stage Fuzzy Transportation Problem, focusing on the application of trapezoidal fuzzy numbers for both supply and demand variables. Our research involves the development of a Python program designed specifically to solve this complex problem. By incorporating fuzzy logic, our approach aims to provide more flexible and accurate solutions compared to traditional methods. The first stage of our model handles the allocation of resources based on fuzzy constraints, while the second stage refines these allocations to optimize overall transportation efficiency. This dual-stage process allows for better handling of uncertainties inherent in supply and demand estimates, potentially leading to more effective decision-making. The implementation of our solution in Python facilitates the application of advanced algorithms and provides a practical tool for researchers and practitioners in the field of fuzzy optimization.

KEYWORDS :

Fuzzy Transportation, Two-Stage, Python Programming, Trapezoidal Fuzzy Numbers

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP16

SYMMETRY AND INVARIANT SOLUTIONS IN DIFFERENTIAL EQUATIONS

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ABSTRACT

This study investigates how symmetry and invariant solutions influence differential equations. Symmetry involves the invariance of differential equations under transformations such as rotations, translations, or scaling. Identifying these symmetries is essential for simplifying complex equations by reducing them to more manageable forms. This simplification facilitates the derivation of invariant solutions, which remain unchanged under specific transformations, thus easing the solving process.Key techniques in this field include Lie group analysis and symmetry reduction. Lie group analysis identifies symmetries within differential equations, while symmetry reduction applies these symmetries to minimize the number of independent variables or equations. These approaches aid in discovering exact solutions and optimizing numerical computations. By leveraging symmetries, deeper insights into the behavior of differential equations can be gained, leading to more efficient solutions. Overall, the study of symmetry and invariant solutions provides crucial tools for analyzing and solving differential equations, with broad applications in various scientific and engineering disciplines.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP17

ESTIMATING MISSING VALUES IN A COMPLETE BLOCK DESIGN OF LATIN SQUARE DESIGN USING VARIABLE CONTROL CHARTS THROUGH RESPONSE SURFACE METHODOLOGY

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ABSTRACT

The complete block design of the Latin Square Design (*LSD*) plays a vital role in the fields of agriculture, medicine, engineering, and statistical quality control. In this paper, we propose a method for estimating one missing value in an*LSD*using variable control charts through Response Surface Methodology (*RSM*). The proposed method involves the construction and analysis of *LSD* to estimate the missing value with the aid of control charts. This approach is applied to estimate the amount of paddy yield across different years. In the statistical analysis, *RSM* is used alongside interaction plots, contour plots, and 3D surface plots.

Keywords: Latin Square Design, Response Surface Methodology, 3D surface plots

2nd ONE DAY INTERNATIONAL CONFERENCE ON
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(ICCMST–2024)

AP18

THE COORDINATES OF THE CENTRE OF CURVATURE

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ABSTRACT

We have given the equations in the parametric form where 't' is the parameter. First we need to differentiate with respect to 't' and then later we do the second derivative with respect to 't'. Differentiate the curve with respect to "t".Find the second derivative with respect to "t". Apply the formula and substitute the values.It is the point at infinity if the curvature is zero . The center of curvature is also the midpoint of the osculating circle. A distance from the curve that is equal to the radius of curvature. A plane curve is usually represented by an equation involving two coordinates x and y. It is then possible to describe its curvature with a formula. Now, we solve for the coordinates of the center of the curvature by applying the formula and putting all the values in the formula, we will get our required.

Key Words: Differentiate and Derivatives ‘’t”, Apply the Formula .

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP19

EXPLORING BASIC CONCEPTS IN NUMBER THEORY AND THEIR PRACTICAL USES

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ABSTRACT

Number theory is a branch of mathematics that focuses on understanding whole numbers and their properties. In this presentation, we will cover important concepts such as divisibility, modular arithmetic, prime numbers, and the greatest common divisor (GCD). Divisibility helps us determine if one number can divide another without a remainder. Modular arithmetic deals with remainders when numbers are divided, and prime numbers are special numbers that can only be divided by 1 and themselves.

These ideas are not just interesting but also very useful in real life, especially in the world of computer science. For example, modular arithmetic is used in creating fast ways to store and access data, like in hashing functions. Prime numbers are essential in cryptography, where they help protect sensitive information, such as in RSA encryption. The GCD helps in finding efficient ways to solve mathematical problems.

By understanding these number theory concepts, we can see their importance in modern technology. Whether it's managing large numbers or keeping our digital communications secure, number theory plays a key role in making our technological world run smoothly. This presentation aims to show how these basic mathematical ideas have practical uses that affect our everyday lives.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
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(ICCMST–2024)

AP20

TRIGONOMETRY

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ABSTRACT

Trigonometry is an area of mathematics that students believe to be particularly difficult and abstract compared with the other subjects of mathematics. Trigonometry is often introduced early in year 8 with most textbooks traditionally starting with naming sides of right-angled triangles. Students need to see and understand why their learning of trigonometry matters.

In this study, particular types of errors, underlying misconceptions, and obstacles that occur in trigonometry lessons are described.Sample: 140 tenth grade high-school students participated in the study. 6 tenth grade mathematics teachers were observed.

A diagnostic test that consists of seven trigonometric questions was prepared and carried out. The students' responses to the test were analyzed and categorized. Observations notes were considered. The most common errors that the students made in questions were selected. Several problematic areas have been identified such as improper use of equation, order of operations, and value and place of sin, cosine, misused data, misinterpreted language, logically invalid inference, distorted definition, and technical mechanical errors. This paper gives some valuable suggestion (Possible treatment of students' error obstacles, and misconceptions) in trigonometric teaching for frontline teachers. The study found students have errors, misconceptions, and obstacles in trigonometry lessons.

Keywords: Instructional misconceptions, learning trigonometry, obstacles.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP21

RING

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ABSTRACT

Rings are a fundamental concept in algebraic mathematics that consist of a set equipped with two operations, addition and multiplication, that satisfy certain properties. Rings have wide-ranging applications across different branches of mathematics. including algebraic geometry, number theory, coding theory, and more. The purpose of this presentation is to provide an overview of the properties and examples of rings, as well as their applications. The scope of the presentation will include definitions and properties of rings, important examples of rings, and some applications of rings in mathematics.

Aring is a set Re-quipped with two operations, usually denoted by*+* for addition and for multiplication. Rings differ from other algebraic structures, such as groups and fields, in that they have two binary operations instead of one, and the multiplication operation need not have an identity element. The properties are important because they allow us to manipulate and solve equations involving elements of the ring, which has numerous applications in mathematics and beyond. Overall, the study of rings is a fascinating and important area of mathematics with many practical applications and theoretical implications. Commutative rings, integral domains, fields, sub rings, and ring homomorphisms are important concepts in the study of rings that enable us to understand their structure and properties. Studying rings can also provide insights into other areas of mathematics, such as number theory and topology.

KEY WORDS : Two operations, addition and multiplication, satisfy certain properties, geometry,

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP22

UNVEILING THE POWER OF DIFFERENTIAL EQUATIONS: REAL-WORLD APPLICATIONS

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ABSTRACT

Differential equations are a fundamental tool for modeling and analyzing complex phenomena in various fields, including physics, engineering, biology, economics, and computer science. This presentation explores the versatile applications of differential equations in understanding and predicting real-world behaviors. We will delve into case studies and examples that demonstrate the significance of differential equations in:

- Modeling population growth and chemical reactions
- Analyzing electrical circuits and mechanical systems
- Simulating epidemiological dynamics and climate models
- Optimizing systems and processes in economics and computer science

Through this presentation, we aim to showcase the breadth and depth of differential equations' applications, highlighting their role in driving innovation and insight across disciplines. By examining the intersection of theoretical mathematics and practical problem-solving, we will uncover the profound impact of differential equations on our understanding of the world and our ability to shape its future.

Key Words : Analysing, real world behavior, practical solving Quadratic Equations

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP23

UNLOCKING THE POWER OF QUADRATIC EQUATIONS: SOLUTIONS AND APPLICATIONS

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ABSTRACT

Quadratic equations, a fundamental concept in algebra, have far-reaching implications in various fields. This presentation delves into the world of quadratic equations, exploring their solutions, methods, and practical applications. We will:

- Examine the quadratic formula and its derivation
- Discuss factoring, graphing, and completing the square methods
- Investigate the properties of quadratic equations, including discriminants and roots
- Showcase real-world applications in physics, engineering, computer science, and economics

Through this presentation, we aim to:

- Demystify quadratic equations and their solutions
- Highlight the significance of quadratic equations in modeling real-world phenomena
- Illustrate the versatility and importance of quadratic equations in various disciplines

By exploring the intricacies and applications of quadratic equations, we will uncover the profound impact of this mathematical concept on our understanding of the world and its many complexities.

Key words : Factoring, graphing, Quadratic.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP24

DIFFIE-HELLMAN AND RSA METHOD IN CRYPTOGRAPHY ALGORITHM USING C PROGRAM TOOLS

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ABSTRACT

In the realm of cryptography, the Diffie-Hellman and RSA algorithms represent foundational approaches to secure communication and data protection. This abstract outlines the implementation of these algorithms using the C programming language, emphasizing their operational mechanisms and applications.The Diffie-Hellman key exchange protocol enables two parties to securely generate a shared secret over an insecure communication channel. This method leverages the mathematical properties of modular arithmetic and the difficulty of solving discrete logarithms. In our C implementation, two parties independently generate their private keys and compute public keys based on a common prime number and base. By exchanging these public keys and combining them with their private keys, both parties arrive at the same shared secret, which can then be used for encrypted communication. The primary advantage of Diffie-Hellman lies in its ability to securely establish a common key without the need for prior key distribution. Conversely, RSA (Rivest-Shamir-Adleman) algorithm provides a method for both secure encryption and digital signatures. It relies on the mathematical challenge of factoring large composite numbers into their prime factors. In the C implementation, RSA involves generating a pair of keys: a public key for encryption and a private key for decryption. The public key is distributed openly, while the private key is kept confidential. Encryption is achieved by raising the plaintext to the power of the public exponent modulo a large prime product. Decryption reverses this process using the private key. RSA's security is predicated on the computational difficulty of factoring large integers, making it a robust choice for secure data exchange and authentication. Both Diffie -Hellman and RSA play critical roles in modern cryptographic systems, with their implementations in C providing a practical demonstration of their principles. This abstract highlights their key functions and showcases their importance in maintaining secure communications and data integrity through C program.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP25

DIABETIC PREDICTION USING MACHINE LEARNING ALGORITHM

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ABSTRACT

One of the most significant chronic illnesses nowadays, diabetes mellitus poses a serious threat to public health. Now, machine learning techniques are being utilized to assess and forecast the likelihood that an individual may develop diabetes. The suggested Machine Learning method is an efficient way to diagnose diabetes. Multinomial Logistic Regression was one of the many methods and algorithms that were previously employed to predict diabetes. This research suggests a new approach to enhance diagnostic efficiency: the use of Weighted K-Nearest Neighbor for Diabetes detection. This novel technique exhibits increased efficacy when compared to Robust Regression.

Keywords: Machine Learning, Supervised Model, Weighted KNN, Diabetes

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP26

A STATISTICAL ANALYSIS OF SYMMETRICAL EXPERIMENTS THROUGH RESPONSE SURFACE METHODOLOGY

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ABSTRACT

Simple experiments like Randomized Block Design (RBD) and Latin Square Design (LSD) allow only one factor to be tested at a time. If we want to test more than one factor, separate simple experiments need to be conducted for each factor. To overcome this limitation, factorial experiments are introduced, where more than one factor can be tested simultaneously. This is the primary advantage of factorial experiments over simple experiments. A secondary advantage of factorial experiments is that not only can main effects be tested, but interactions between factors can also be analysed. Factorial experiments can be classified into two types namely symmetrical factorial experiments and asymmetrical factorial experiments. In this paper, we propose a new statistical analysis of 2^3 symmetrical experiments using Response Surface Methodology (RSM) through a numerical example.

Key words: Randomized Block Design, Latin Square Design, Factorial Experiments, Response Surface Methodology.

CALCULUS AND A2nd ONE DAY INTERNATIONAL CONFERENCE ON "COMPUTATIONAL MATHEMATICS AND STATISTICS" (ICCMST–2024)

AP27

NALYTICAL GEOMETRY

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ABSTRACT

In this project we have discussed derivatives such as definition, History, Real life applications, and application of derivatives in different science. This document is an assignment submission for a course on calculus and analytical geometry. It includes an introduction to calculus outlining its major branches of differential and integral calculus. It then discusses even applications of calculus in computer science including data mining, robotics, algorithm analysis, and scientific computing. It also discusses six applications of analytical geometry in computer science such as for graphs, communication network analysis, and cartography. The document concludes with reference used.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP28

VECTOR CALCULUS

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ABSTRACT

We present a new package, VEST (Vector Einstein Summation Tools), that performs abstract vector calculus computations in Mathematica. Through the use of index notation, VEST is able to reduce three-dimensional scalar and vector expressions of a very general type to a well defined standard form. In addition, utilizing properties of the Levi-Civita symbol, the program can derive types of multi-term vector identities that are not recognized by reduction, subsequently applying these to simplify large expressions. In a companion paper Bur by teal. We employ VEST in the automation of the calculation of high-order Lagrangians for the single particle guiding center system in plasma physics, a computation which illustrates its ability to handle very large expressions. VEST has been designed to be simple and intuitive to use, both for basic checking of work and more involved computations.

Key words : High-order Lagrangians, index notation, Levi-Civita symbol

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP29

INVERSE GAMMA DISTRIBUTION-BASED DEWMA CONTROL CHART FOR PROCESS MONITORING

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ABSTRACT

Statistical Quality Control (SQC) is a set of statistical techniques used to monitor and control the quality of processes. The **Exponentially Weighted Moving Average (EWMA) Control Chart** is a type of control chart used for monitoring small shifts in the process mean over time. The **Double Exponentially Weighted Moving Average (DEWMA)** is more advanced and tracks both the average and the trend, making it suitable for processes that change direction over time. In this study, we develop and analyze a Double Exponentially Weighted Moving Average (DEWMA) control chart based on the Inverse Gamma distribution for process monitoring. We derive the control limits for the DEWMA chart using the parameters of the Inverse Gamma distribution and evaluate its performance through Average Run Length (ARL) and Standard Deviation Run Length (SDRL) metrics. The proposed control chart is compared with conventional control charts to assess its sensitivity and effectiveness in detecting small shifts in the process mean. Inverse Gamma Distribution Double EWMA (IGD-DEWMA) is a method used in quality control to monitor and detect changes in a process. It combines the moving average technique (EWMA) with the Inverse Gamma distribution to provide more accurate results. By using two smoothing parameters, it becomes more sensitive to small changes in the process over time.

Keywords: Statistical Process Control (SPC), Inverse Gamma Distribution, DEWMA Control Chart, Process Monitoring, Average Run Length (ARL)

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP30

IMPLICATIONS OF MODELLING MORTALITY WITH TIME-VARYING EFFECTS IN SURVIVAL ANALYSIS OF HEART FAILURE PATIENTS

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ABSTRACT

Heart failure, which impairs the heart's ability to pump blood efficiently, is a growing global public health issue with a high mortality rate worldwide. Heart disease (HF) affects the heart or blood vessels and impacts people of all ages. The increasing death rate due to heart failure highlights the need to understand the factors influencing patient survival. To address this, we included 299 heart failure patients in our study, using secondary data from medical records available in the Kaggle dataset. We employed multiple machine learning classifiers to rank the most critical risk variables and predict patient survival. Additionally, we conducted a comparative analysis using conventional statistical methods and evaluated their outcomes against machine learning techniques. Both feature ranking algorithms identified cardiovascular activity (physical activity) and heart failure or heart disease as the most relevant features. Consequently, our machine learning survival prediction models are based solely on these variables. The results indicate that time and event (survival or death) are sufficient to predict survival in patients with heart failure and heart disease. We also performed an analysis with several months of follow-up for each patient. In this case, BMI, systolic and diastolic blood pressure, time, and event (survival or death) emerged as the most predictive clinical features to predict patient survival.

Keywords: Heart disease, Feature Prediction, BMI, Systolic and Diastolic, Activity and Cadio, Mortality event.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP31

SOLVING NONLINEAR EQUATIONS USING THE BISECTION METHOD IN PYTHON

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ABSTRACT

The bisection method is a fundamental numerical technique for solving nonlinear equations, particularly when analytical solutions are challenging to obtain. This method leverages the Intermediate Value Theorem, which states that for any continuous function, if it takes opposite signs at two points in an interval, there exists at least one root within that interval. The bisection method systematically narrows down the interval by iteratively halving it and selecting the subinterval that contains the root.This paper presents the implementation of the bisection method in Python, outlining a clear algorithm and a practical example.The function f(x)=x^3−x−2 within the interval [1,2].The process begins by checking that the function values at the endpoints have opposite signs. The interval is then repeatedly halved, focusing on the subinterval that contains the root, until the width is smaller than a specified tolerance level.Our results show that the bisection method efficiently provides accurate approximations of the root. This method is valuable in various scientific and engineering applications due to its simplicity and reliability. Future work may explore ways to enhance the bisection method by combining it with other techniques for improved accuracy and speed. This paper serves as a foundational overview of the bisection method, inviting further exploration into its practical uses in solving mathematical problems.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP32

SOLVING TRANSPORTATION PROBLEM USING PYTHON

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ABSTRACT

The transportation problem is a crucial aspect of operations research, specifically in logistics and supply chain management, where it seeks to determine the most cost-efficient way to distribute products from a set of suppliers to a set of consumers while adhering to supply and demand constraints. This problem can be mathematically formulated as a linear programming problem, allowing for the application of various optimization algorithms. In this paper, we explore a practical approach to solving the transportation problem using Python, taking advantage of its powerful libraries such as NumPy and SciPy. We begin by outlining the foundational principles of the transportation problem, including its formulation, constraints, and the significance of finding an optimal solution. The cost matrix, which represents the transportation costs between each supplier and consumer, serves as a critical component of our approach. We discuss initial feasible solution methods, including the Northwest Corner Rule, Least Cost Method, and Vogel's Approximation Method, which provide a starting point for optimization. Subsequently, we delve into optimization techniques such as the Stepping Stone Method and the Modified Distribution (MODI) Method, which refine the initial solutions to achieve minimal transportation costs. Our implementation in Python demonstrates the effectiveness of these methods, providing a step-by-step guide to constructing the cost matrix, formulating constraints, and utilizing the SciPy library's linear programming capabilities. To illustrate the practical application of our approach, we present a comprehensive example involving three suppliers and three consumers, detailing the supply and demand quantities along with the associated transportation costs. The results indicate not only the optimal transportation plan but also the minimum cost incurred, offering insights into potential cost savings for businesses.

Overall, this paper highlights the accessibility of solving complex optimization problems using Python, emphasizing its relevance in real-world applications. Our findings contribute to a deeper understanding of logistics optimization and showcase the potential for further research and application in various industries.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP33

EIGENVALUES OF RELATIVELY PRIME GRAPHS CONNECTED WITH FINITE QUASIGROUPS

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ABSTRACT

A relatively new and rapidly expanding area of mathematics research is the study of graphs' spectral properties. Spectral graph theory plays a very important role in understanding certifiable applications such as cryptography, combinatorial design, and coding theory. Non associative algebras, loop groups, and quasigroups are the generalizations of associative algebra. Many studies have focused on the spectral properties of simple graphs connected to associative algebras like finite groups and rings, but the same research direction remains unexplored for loop groups and quasigroups. Eigenvalue analysis, subgraph counting, matrix representation, and the combinatorial approach are key techniques and methods in our work. The main purpose of this paper is to characterize finite quasigroups with the help of relatively prime graphs. Moreover, we investigate the structural and spectral properties of these graphs associated with finite quasigroups in the forms of star graphs, eigenvalues, connectivity, girth, clique, and chromatic number.

Key words*:* Spectral graph, Clique, Chromatic number

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP34

HYPERCONNECTED IDEAL TOPOLOGICAL SPACES

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ABSTRACT

Throughout the present paper, (X, τ) or (Y, σ) will denote a topological space with no separation properties assumed. For a subset A of a topological space (X, τ), Cl(A) and Int(A) will denote the closure and interior of A in (X, τ), respectively. Throughout the present paper, (X, τ) or (Y, σ) will denote a topological space with no separation properties assumed. For a subset A of a topological space (X, τ), Cl(A) and Int(A) will denote the closure and interior of A in (X, τ), respectively.

Several notions which are equivalent to hyper connectedness were investigated in the literature such as the notions of D-spaces, semi-connected spaces, s-connected spaces, irreducible spaces. On the other hand, the notion of ideal topological spaces was studied by Kuratowski and Vaidyanatha swamy . In 1990, Jankovic´ and Hamlett investigated further properties of ideal topological spaces. In this paper, the notion of *-hyperconnected ideal topological spaces are introduced and studied. Characterizations and properties of *-hyperconnected ideal topological spaces are investigated.

Key words: *-hyperconnected ideal topological space, *-nowhere dense set, *-dense set, semi*-I-open set.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP35

CRYPTOGRAPHY

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ABSTRACT

Mathematics is at the heart of cryptography, which is the study of techniques for secure communication in the presence of third parties. Cryptography uses mathematical algorithms to encode messages in a way that only the intended recipient can decode them, while keeping the message confidential from any unauthorized parties.

One of the most important mathematical concepts used in cryptography is modular arithmetic, which involves operations on numbers that wrap around after reaching a certain value (known as the modulus). This is used to perform operations on large numbers that are difficult to break using brute force methods.

Another important mathematical concept in cryptography is number theory, which is the study of the properties of whole numbers. Prime numbers are of particular importance, as they are used to generate cryptographic keys, which are used to encode and decode messages. The difficulty of factoring large prime numbers is at the heart of many modern cryptographic systems.

Key words*: Cryptography, Modular arithmetic, Prime numbers*

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP36

BOOLEAN ALGEBRA AND LOGIC GATES

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ABSTRACT

Boolean algebra is the mathematical foundation of logic design. It was invented by great mathematician George Boole in the year 1847. In 1937, the logic design of the Boolean algebra was given by Claude Shannon in his award winning paper "A symbolic Analysis of Relay and Switching Circuits" (Balabanian and Carlson, 2001; Camara, 2010) Boolean functions and their different operations are shown by certain diagrams (Muller, 1954). These diagrams are called logic gates. From the beginning, Boolean algebra and logic gates has drawn special attention to logicians, mathematicians, philosophers, computer scientists and programmers, electronic engineers etc. Boolean algebra is the backbone of computer technology. In this paper we discuss about Boolean algebra and logic gates.

Keywords: Boolean algebra, Logic gates, Philosophers

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP37

SEQUENCES AND SERIES OF FUNCTIONS

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ABSTRACT

Mathematical analysis is the rigorous study of certain objects, with a focus on trying to pin down precisely and accurately the qualitative and quantitative behavior of these objects. Real analysis is the branch of mathematical analysis which studies the behavior of real numbers, sequences and series of real numbers, and real-valued functions. Some particular properties of real-valued sequences and functions that real analysis studies include convergence, limits, continuity, smoothness, differentiability, and integrability.

A decimal representation of a number is an example of a series, the bracketing of a real number by closer and closer rational numbers gives us an example of a sequence. We want to study these objects more closely because this conceptual framework will be used later when we look at functions and sequences and series of functions. First, we will take on numbers. Sequences have an ancient history dating back at least as far as Archimedes who used sequences and series in his "Method of Exhaustion" to compute better values of π and areas of geometric figures.

Keywords: Differentiability, integrability, convergence

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP38

CRYPTOGRAPHY

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ABSTRACT

'Modern Algebra', also called 'Abstract Algebra', is the branch of mathematics concerned with the general algebraic structure of various sets (such asreal numbers, complex numbers, matrices, and vector spaces), rather than rules and procedures for manipulating their individual elements. Modern algebra is the set of advanced topics of algebra that deal with abstract algebraic structures rather than the usual number systems. Algebraic structures include groups, rings, fields, modules, vector spaces, lattices, and algebras.

A definitive treatise, Modern Algebra, was written in 1930 by the Dutch mathematician Bartel van der Waerden, and the subject has had a deep effect on almost every branch of mathematics. Principally, modern algebra is an area of mathematics that includes the study of algebraic structures like rings, fields and vector spaces. In this paper we discuss about Group theory in detail.

Key words*: Real numbers, Complex numbers, Rings, Fields*

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP39

OSCILLATION PROPERTIES OF CERTAIN CLASS OF FRACTIONAL MATRIX HAMILTONIAN SYSTEMS

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ABSTRACT

In this paper, we present oscillation criteria in terms of the coefficient functions for the fractional matrix Hamiltonian system, $D_+^{\alpha}U(t) = A(t)f\big(K(t)\big) + B(t)V(t)$, $V'(t) = C(t)f\big(K(t)\big) - A^{*}(t)V(t)$, where $\alpha \in (0,1]$ and D_+^{α} denotes the Riemann – Liouville derivative with$A(t)$,$B(t)$, $f(K(t))$ are n x n matrices of real valued continuous functions on $t > t_0 \geq 0$,$B(t)$ is symmetric and positive definite , $C(t)$ is symmetric. In this paper first we obtain the above mentioned first order fractional matrix Hamiltonian system convert into second order fractional matrix equation of the form $\frac{d}{dt}\big(D_+^{\alpha}Y(t)\big) + P(t)D_+^{\alpha}Y(t) + Q(t)f(\int_0^t (t-s)^{-\alpha}Y(s))ds = F(t),\ t > t_0 \geq 0$. The following assumptions are
(C1) P(t) and Q(t) are n x n matrices with real valued continuous functions on the interval $[t_0, \infty)$. P(t)is symmetric, positive definite matrix for $t_0 \geq 0$.
(C2)$f: M_n \to M_n$and is M_n the vector space of all n x n real symmetric matrix, " f " is continuously differentiable in $\square^{n^2}$.Y(t)f(Y(t)) is positive definite for detY(t)≠0.
Motivated by Philos, even more authors acquired sufficient conditions for oscillation of Matrix differential equations with damping .So it follows we have to establish some oscillation criteria for all the solutions of above equation by using generalized Riccati technique and integral averaging method .Hamiltonian matrix systems arise in many dynamical systems; the qualitative properties of Hamiltonian systems and matrix differential systems have been widely studied in many authors. Riemann – Liouville derivative is important mathematical models use fractional order derivatives. But the most frequently used definitions involve integration which is nonlocal. We illustrate the validity and effectiveness of our newly obtained results providing suitable example.

Keywords : oscillation, Hamiltonian matrix, fractional.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP40

ON THE NEW OSCILLATOIN FOR CERTAIN CLASS OF RAYLEIGH BEAM EQUATIONS

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ABSTRACT

Main objective of this paper, we present some new oscillatory behavior of certain class of Rayleigh beam equations with damping term and sufficient conditions for the oscillation under the hinged-hinged ends boundary conditions. Our approach is reduce to the multidimensional problems to one dimensional problem by using assuming the assumptions and integration by parts with boundary condition. The main tool of this paper by using integral average method, Riccati transformation and Philo's type. The Rayleigh beam theory provides a marginal improvement on the Euler-bernoulli theory by including the effect of rotation of the cross-section. It partially corrects the overestimation of natural frequencies are still overestimated. Early investigators Davies include the effect of rotatory inertia of the bar. It is used here to account for the rotary motion of beam. This approach also allows for the description of flexural waves at high frequency ranges. As such applications as railroad track, highway payment, buried pipelines and foundation beams. In the Rayleigh beam theory, the assumptions regarding the geometry of the deformation and the material properties remain unchanged so that the rotation of the cross section is not an independent parameter, but it is constrained to the transverse displacement by the relation. The co-efficient of ρ is a density, A is cross-section area, I is a moment of inertia, γ is damping term of co-efficient, w(x, t) is the vertical displacement at position x and time moment t, f(x, t) is non-homogeneous forcing function of both space and time, w(x, t) is the beam deflection. The results improve and generalize there given in some previous papers, which can be seen by the examples given at the end of this paper.

Keywords: beam equations, oscillation, hinged boundary condition.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP41

ANALYSIS

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ABSTRACT

System development is model building. Starts when a requirement of system identified Specification can be used for contract and to plan and control the development process. As Complex process handle poorly so any systematic method like structured or OOAM can used from start to end of system life cycle. Advantages of Structured analysis and design visual, so it is easier for users/programmers to understand. Makes good use of graphical tools A mature technique. Process-oriented approach is a natural way of thinking. Simple and easy to understand and impalement. Object-Oriented analysis and design becoming popular because of its ability to thoroughly: Represent complex relationships, as well as represent data and data processing with a consistent notation . Object-Oriented analysis and design blend analysis and design in evolutionary process. It allows you to deal with the complexity inherent in a real-world problem by focusing on the essential and interesting features of an application.

Key words : Object , Attribute , Operation , Interface (Polymorphism) , Component , Package , Subsystem, Relationships.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP42

COMPUTATIONAL STATISTICS

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ABSTRACT

Statistics is the science which deals with collection, classification and tabulation of numerical facts as the basis for explanation, description and comparison of phenomenon". Different Statistical Software Data Preparation, Management, Manipulation, Summarization with: Ms. Excel Data Tabulation and Visualization. Generate Different Statistical Distribution Simple Linear Regression and Correlation Basic R Programming Developing Simple Graphical User Interface in R Re sampling Methods Statistical Inference. Hypothesis testing: one, two sample t-test (test for mean difference, proportion and variance) Analysis of Variance (Anova): one and two way Anova. Exploring data: Using graphical and numerical techniques to study patterns and departures from patterns (in order to interpreting data) Sampling and experimentation: Clarifying the question, deciding on methods of collection and analysis to produce valid information. Anticipating patterns: Exploring random phenomena using probability and simulation. Probability is our tool for anticipating distributions. Statistical Inference: Estimating population parameters and testing hypothesis.

Key words : Excel , LibreOffice Calc , R , MINITAB , CS Pro , SAS ,WinBugs, Stata, Epilnfo

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP43

ALGEBRAIC GEOMETRY

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ABSTRACT

Studying systems of polynomial equations in several variables and using abstract algebraic techniques for solving geometrical problems about zeros of such systems. Establishing correspondences between geometric and algebraic objects . Fundamental objects of study are algebraic varieties.

Algebraic geometry is a branch of mathematics that uses abstract algebraic techniques to solve geometrical problems. It studies the solutions of systems of polynomial equations in one or more variables, and the fundamental objects of study are algebraic varieties. Algebraic varieties are geometric manifestations of these solutions, and can be curves, surfaces, or higher dimensional objects.Algebraic geometry is a very abstract subject, studied for beauty and interest alone. However, there are always interesting applications of pure mathematics, with algebraic geometry no exception - see here for an interesting discussion. In algebraic statistics, techniques from algebraic geometry are used to advance research on topics such as the design of experiments and hypothesis testing . Another surprising application of algebraic geometry is to computational phylogenetics.

Key words : Curves , Surfaces , Higher dimensional objects , Algebraic varieties.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP44

APPLICATION OF INTEGRATION IN REAL LIFE

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ABSTRACT

Integration, a cornerstone of calculus, plays a crucial role in solving real-world problems across multiple fields such as physics, engineering, economics, and biology. It is used to calculate areas under curves, volumes, and cumulative quantities, aiding in the analysis of complex systems. This paper explores the historical development of integration, from its origins in ancient civilizations to its modern applications. Different types of integration, such as definite, indefinite, numerical, and improper integration, are discussed in relation to their practical uses. The application of integration extends to diverse areas, including motion in physics, structural design in engineering, market predictions in economics, population models in biology, and pollutant dispersion in environmental science. Its versatility makes it a vital tool for modeling, analysis, and optimization in both scientific and everyday contexts.

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"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP45

DIFFERENTIAL EQUATIONS

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ABSTRACT

In Mathematics, a differential equation is an equation that contains one or more functions with its derivatives. The derivatives of the function define the rate of change of a function at a point. It is mainly used in fields such as physics, engineering, biology and so on. The primary purpose of the differential equation is the study of solutions that satisfy the equations and the properties of the solutions. Learn how to solve differential equations. Often when a closed-form expression for the solutions is not available, solutions may be approximated numerically using computers. The theory of dynamical systems puts emphasis on qualitative analysis of systems described by differential equations, while many numerical methods have been developed to determine solutions with a given degree of accuracy. Types are Ordinary differential equations , Partial differential equations , Non-linear differential equations , Equation order and degree. The recognize differential equations that can be solved by each of the three methods, direct integration, separation of variables and integrating factor method, and to use the appropriate method to solve them. Use an initial condition to find a particular solution of a differential equation, given a general solution.

Key words : Derivatives , Numerical methods , Theory of dynamical system.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP46

EULER'S THEOREM OF HOMOGENEOUS FUNCTION

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ABSTRACT

Euler's Theorem is used to establish a relationship between the partial derivations and the function product with its degree. A homogenous function of degree n, with x, y & z variables is a function in which all terms are of degree n. Euler's theorem states that if a function z is homogenous of degree n in variables x and y. then the partial derivatives of z with respect to x and y sum to z . A homogenous function of degree n is a function where all terms are of degree n To understand the theorem, you must first learn the fundamentals of solving the homogenous function theorem. The most important part of solving the theorem is differentiation. Euler's theorem on homogenous function is quite popular through its objective are always left unnoticed, when inputs are multiplied by any number, the output increses by some factor to making the theorem useful in fields like economics. It helps to determine aggregate scales.

Key Words : Partial derivations , Homogeneous function , nth degree , x,y and z variables

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP47

A SIGNIFICANCE STUDY ON DOWNTON STATISTIC IN STATISTICAL PROCESS CONTROL WITH SIX SIGMA

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ABSTRACT

Quality control and improvement is a set of activities aimed at ensuring that products and services meet standards and are continually improved.Because variation is often the main cause of quality degradation, statistical approaches such as statistical process control and experimental design are essential tools in quality control and improvement.The capacity indices allow us to place the distribution of our process concerning the limits of the product specification. The capacity indices must be used to study if the process is capable, despite its full variability, to meet certain criteria. It is also a measure of the manufacturability of a product using a specified technology. This research paper proposes to construct Six Sigma based control charts using the Interquartile Range (IQR) and Downton Statistic (Dn) under non-normal distribution and Average Run Length (ARL) as an alternative to the Shewhart (1931) map, which has been demonstrated to perform better when the underlying normality assumptions are not met.

Keywords: Interquartile range, Non-normality, Process control and Six sigma.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP48

A BAYESIAN APPROACH IN PROCESS CONTROL FOR CONSTRUCTING SIX SIGMA BASED CONTROL CHARTS

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ABSTRACT

The rapid advancement of artificial intelligence, service automation is developing as a new wave of the industrial revolution. Standardization and consistency in service quality are critical components of the automation process. Quality control methods often employed in the manufacturing industry may be utilized to test service quality and monitor service processes. Online control chart monitoring, in particular, may be utilized to immediately detect signs indicating when the service process is out of control. A service process, on the other hand, is more difficult to manage than a manufacturing process since its unpredictability is caused by a variety of complicated causes. The Simulation studies on normal, exponential, and mixtures of normal and exponential processes prove that the diagram can rapidly detect any changes in the process variance. In this research article, a numerical example of bank service time is used to illustrate the application of the proposed six sigma-based control charts for Exponentially weighted moving average (EWMA)with Bayesian variance diagram and verify the effectiveness of process control.

Keywords: Bayesian variance, Control chart, Exponential distribution, Exponentially weighted moving average (EWMA) and Six sigma.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP49

CONSTRUCTION OF CONTROL CHARTS BASED ON SIX SIGMA WITH SEROCONVERSION TIME UNDER GAMMA DISTRIBUTION

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ABSTRACT

A stochastic model for the spread of acquired immunodeficiency syndrome (AIDS) in a heterosexual community. The HIV seroconversion period refers to the interval between HIV exposure, infection, and the development of antibodies detectable by a test. This might take many weeks and is also known as the window period. Many recently developed stochastic models for the estimate of anticipated time to seroconversion and its variation are generated under the premise that the threshold level of antigenic diversity is a random variable. The gamma distribution and the inter-arrival periods between contacts follow an exponential distribution. The Six Sigma approach may be used to assess the analytical performance of biochemical analytes across numerous laboratories. It may also assist create and improve statistical quality control systems. The Six Sigma approach can assist to minimize medical mistakes and expenses while also improving patient safety. Control charts can be used in healthcare to assist detect sources of error and distinguish between common and unique causes of variance. These two sorts of variations necessitate distinct reactions from healthcare management. In this research paper, an attempt is made to develop six-sigma-based control charts utilizing sero conversion time under Gamma distribution, with an appropriate example.

Keywords: *Control chart, Gamma distribution, Seroconversion, Six sigma and Stochastic model.*

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP50

A STATISTICAL ANALYSIS OF AGRICULTURAL COMMODITIES PRICE IN INDIA USING MACHINE LEARNING APPROACH

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ABSTRACT

This research proposes an effective framework for crop price prediction based on machine learning to help farmers estimate their profit-loss in advance. Four functional components make up the suggested work: forecasting crop yield, estimating supply and demand, and forecasting crop pricing. The input datasets include the different field values, including yield, crop remaining at year's end, import, crop price, and demand. Crop yield predictions are made using a variety of time series-based methods, including exponential smoothing, autoregressive integrated moving average, and autoregressive moving average. Three factors are added together to determine the crop's supply: import values, residual values, and anticipated crop output. Due of its stronger link with a given year than with other factors, the demand for the crop is projected based solely on that year. The time series method, statistical methodologies, and machine learning techniques are some of the methods used to anticipate the crop price based on supply, demand, and year. The optimal model with the lowest root-mean-square error value is then identified by comparing these three price prediction methods. It is determined that, among the models tested in the suggested work, the decision tree regressor is the most effective at predicting crop price. Simulation findings demonstrate the relative advantage of the proposed work over the current methods in several dimensions.

Keywords: Agricultural Commodity; Crop Price; Prediction; Machine learning models; ARIMA

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP51

RENEWABLE ENERGY USE, AGRICULTURAL PRODUCTIVITY, AND ECONOMIC EXPANSION IMPACT ON ENVIRONMENTAL SUSTAINABILITY IN INDIA: EMPIRICAL EVIDENCE FROM ARDL APPROACH

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ABSTRACT

This study aims to investigate the effects of agricultural productivity and the use of renewable energy on India's consumption-based emissions of carbon dioxide (CO_2) while taking economic expansion into consideration. This study applies the autoregressive distributed lag (ARDL) technique, dynamic-ordinary least square (DOLS), fully-modified ordinary least square (FMOLS), and gradual shift causality testing based on the paper's goal. The results unequivocally show that, whereas consumption-based CO2 emissions in India are lowered by agricultural productivity and the usage of renewable-energy, consumption-based CO_2 are raised by economic expansion. When using ARDL, DOLS, FMOLS and estimators, the gradual shift causality test yields consistent findings. This paper proposed regulatory policy instruments that are powerful enough to prevent environmental deterioration in order to promote sustainable development.

Keywords: carbon dioxide (CO2) emissions, agricultural productivity, economic expansion, renewable energy consumption, ARDL model, gradual shift causality

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP52

NEUTROSOPHIC NEBULULOUS SEMI –NANO SOFT TOPOLOGICAL SPACE

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ABSTRACT

In a traditional topology,the generalized topological space develops the TopologicalSpace and Supra Topological Space.In this my work we define and study of NeutrosophicNebululous Semi –Nano Soft Topological Space which is more generalization than than theNeutrosophic supra Topological Space,we study New " Neutrosophic Nano closed(open) sets ''in this new space such as "Neutrosophic Semi Nano closed(open) sets'',"Neutrosophic SemiNano Soft closed(open) sets'' and we obtain its basic properties and study the relation betweenthem.Finally,weintroduced'The associated frontier point and boundary point''NeutrosophicNebululous Semi –Nano Soft Topological Space.

Keywords: Neutrosophic Nebululous Semi –Nano Soft Topological Space, Neutrosophic Semi

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP53

NANO SOFT TOPOLOGICAL SPACE, NEUTROSOPHIC NANO CLOSED SETS.

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ABSTRACT

In this paper we define the Neutrosophic Nano Sets properties.We introduce new definition for Semi Nano Supra and also gives the basic specifications for the new definitions ofn Neutrosophic Semi topological space in Neutrosophic nanosupra Topological Space .We also obtained some operations that shown the connection between Neutrosophic Semi Topological Space and Neutrosophic Nano Semi open sets in the Neutro sophic Topological Space.

Keywords:

Neutrosophic Nano set,Neutrosophic Nano Topological Space,Neutrosophic Semi- Nano Topological Space, Neutrosophic Semi Nano -Supra Topological Space.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP54

FRACTIONAL-ORDER COMPLEX-VALUED NEURAL NETWORKS WITH LEAKAGE AND DISCONTINUOUS DELAYS: STABILITY ANALYSIS

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ABSTRACT

This research studies the uniform stability problem for fractional-order complex-valued neural networks that have discrete delays in addition to leaking. We propose a necessary criterion for the existence and uniqueness of the equilibrium point of the addressed neural networks, based on the concept of contracting mappings.Some delay-dependent criteria are proposed for verifying the global uniform stability of fractional-order complex-valued neural networks by the use of analysis techniques. To validate the proposed conclusions and show their viability, two numerical examples are presented. Complex-valued neural networks, which are known to be an extension of real-valued neural networks that have complex-valued states, outputs, connection weights, and activation functions, are among the most thoroughly studied topics in numerous study fields. We will address the fractional-order complex-valued neural networks with leakage and discontinuous delays: stability analysis in addition to leaking. In the meantime, research is being done on the existence, uniqueness, and global uniform stability of the equilibrium point of the neural networks under consideration. Lastly, two numerical examples are provided to show how well the suggested theoretical results work. When compared to previous findings, this paper's primary contributions are the following: (i) The fractional-order complex-valued delayed neural network's activation functions (ii) We consider the effects on uniform stability of both discrete and leaky delays for fractional-order complex-valued neural networks. (iii) In contrast to previous results, ours are less conservative and more generic.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP55

ANALYSIS OF BOTH DISCRETE AND LEAKAGE TIME VARYING IN FRACTIONAL-ORDER COMPLEX-VALUED BIDIRECTIONAL ASSOCIATIVE MEMORY NEURAL NETWORK STABILITY

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ABSTRACT

In this paper, we study the analysis of both discrete and leakage time varying in fractional-order complex-valued bidirectional associative memory neural network stability. An adequate condition for the presence and uniqueness of the equilibrium point of the neural networks under consideration is put forth, based on the contracting mapping principle. Methods of analysis are used to construct some delay-dependent criteria for verifying the global uniform stability of fractional-order complex-valued neural networks. To show the correctness and viability of the suggested results, two numerical examples are provided. These networks have discrete and distributed time-changing delays. It is difficult to determine the settling time and to compute this criterion. Changing here, we examine this problem using a few analytical methods and basic inequalities. This is how the remainder of the paper is structured. These networks have discrete and distributed time changing delays. It is difficult to determine the settling time and to compute this criterion. Here, we examine this problem using a few analytical methods and basic inequalities. This is how the remainder of the paper is structured. The network model and some preliminary work are covered in Section 2. First, a sufficient condition to guarantee the finite-time stability of systems is derived in Section 3. After that, a sufficient condition is found to guarantee the systems' global asymptotic stability. Lastly, a few findings directly pertaining to the equilibrium point are provided. A few instances are given in Section 4 to confirm the usefulness of the primary findings that were gained. Section 5 concludes with some recommendations and suggests some areas for future research.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP56

A NEW TOPOLOGICAL OPERATOR OVER TEMPORAL NEUTROSOPHIC FUZZY SETS

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ABSTRACT

We will introduce two operators which are analogous to the topological operators of closure C, and interior over temporal neutrosophic fuzzy sets also study some of their relations between the modal and the topological operators over the TNFSs. The conservatory of vague set of affiliation rate plus non-affiliation rates are not satisfied our fulfillment, but this concept TNFSs part have more important here, meanwhile the stage progression using time in the extensions of neutrosophic sets give the great result used for choose their choice in real life situations.

Keywords: Intuitionist Fuzzy Sets, Temporal Intuitionist Fuzzy Sets, Neutrosophic Set (NS), temporal Intuitionist Fuzzy Sets and Temporal Neutrosophic Set.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP57

PARAMETRIC AND BOUNDED VARIABLES LINEAR PROGRAMMING PROBLEMS IN OPERATIONS RESEARCH

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ABSTRACT

In this paper, we study on a parametric and bounded variables linear programming problems**.** Linear programming is a powerful optimization technique widely used in operations research to solve problems involving the allocation of limited resources. In parametric linear programming,We investigate the behavior of optimal solutions across varying parameter values and present methods for efficiently solving the parametric LPP. In bounded variable linear programming, decision variables are subject to upper and lower bounds, reflecting real-world limitations such as resource capacities, budget constraints, or regulatory limits.

The results demonstrate the efficacy of parametric and bounded-variable approaches in providing flexible and realistic solutions to problems in operations research, offering a robust framework for future advancements in optimization and decision-making strategies. We can study some examples on our paper.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP58

VERTEX COLORING IN FUZZY GRAPH

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ABSTRACT

The concept of the paper is COLORING THE VERTEX IN FUZZY GRAPH. Vertices are assigned colors based on fuzzy relations, allowing for a degree of membership in multiple color sets. We explore the mathematical foundations of this concept, presenting algorithms for determining optimal fuzzy coloring and analyzing their computational complexity. Additionally, we discuss the α-strong, β-strong, and γ-strong vertices in fuzzy graph. Also, we analyze some properties of strong vertices in fuzzy graph.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP59

EAR DECOMPOSITION IN GRAPH

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ABSTRACT

In this paper discussed about EAR DECOMPOSTION OF NONSEPARABLE GRAPHY IN GRAPHY THEROY. Ear means breaks down the graph into simpler components. Additionally, we see some Proposition and theorem of ear decomposition. Ear, Along with we have explained the Nested sequence.

Key words: Ear,Ear decomposition, Nested sequence.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP60

FIBONACCI AND TRIBONACCI NUMBERS

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ABSTRACT

This paper is on FIBONACCI AND TRIBONACCI NUMBERS .we say about Fibonacci, Fibonacci modulo m and Lucas. Fibonacci numbers are strongly related to the golden ratio, Binet formula expresses the n^{th} Fibonacci numbers in terms of n and the golden ratio and implies that the ratio of two consecutive Fibonacci number tends to the golden ratio as n increase. Also the Tribonacci series is an extension of Fibonacci series. The Tribonacci numbers are defined as the sum of three preceding ones, starting from 1 & 3, which are homogeneous linear recurrence with constant coefficient of order 3 with signature (0, 0, 1).

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP61

A STUDY ON CAYLEY GRAPH

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ABSTRACT

In this paper, We have studied about Cayley graph in algebraic graph theory. A graph is an ordered triple. We discuss about Cayley graph and Bipartite Cayley graph. The idea of group based graphs by consideration of what we today call Cayley's Theorem. This group constructed graph the colour graph and it was renamed the Cayley graph or Cayley colour graph. We given connection between group theory and graph theory. And also strongly regular graph from part of the family of algebraic graphs. The Parameters (n,r, λ, μ) of strongly regular graph are also explained.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP62

PRIME NUMBERS IN CRYPTOGRAPHY

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ABSTRACT

This paper is on PRIME NUMBERS IN CRYPTOGRAPHY .In cryptography, we have two important methods to encrypt messages : symmetric and asymmetric encryption. In the symmetric case, both parties share the same key. we use the same key to encrypt and decrypt a message. In the asymmetric case, we can use a public and a private key. Here , we can choose the prime number to work in encryption and decryption in both ways . Also we given algorithm to create a key for Encryption.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP63

NON-HOMOGENEOUS PARABOLIC PARTIAL DIFFERENTIAL EQUATIONS

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ABSTRACT

In this paper, we studied "Non-Homogeneous Parabolic Partial Differential Equations". In Partial Differential Equation, we have three canonical form that is Parabolic, Hyperbolic, Elliptic. Here we have discussed the Parabolic Equation only. The condition of parabolic equation is b^2-4ac=0. We have given some theorems based non-homogeneous equation. Also we discussed some examples of second order equation with constant co-efficients.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP64

A STUDY ON HOMOGENEOUS AND NON-HOMOGENEOUS LINEAR EQUATION

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ABSTRACT

This paper is on **"A STUDY ON HOMOGENEOUS AND NON HOMOGENEOUS LINEAR EQUATION"**. In this paper, we have studied about linear homogeneous and non-homogeneous equations with constant coefficient and variable coefficient. All solution of homogeneous equation can be found by a simple device which reduces the problem to the algebraic one of locating roots of a polynomial. The solutions of the non-homogeneous equation can be generated by using the solution of the corresponding homogeneous equation, together with integration involving the function b. We have proved some theorems in the second order, which is also extended in n^{th} order for both homogeneous and non-homogeneous linear equations. Also we have given a special method for solving problem. This method is also used to solve some problems on n^{th} order also.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP65

INFRA TOPOLOGICAL SPACES

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ABSTRACT

This paper is on "Infra Topological Spaces" An Infra-Topological Spaces is a collection of subsets of a Universe that includes the empty set and the entire Universe X. We discussed about infra open,infra closed, infra continuous sets. We introduced the infra derived sets in infra topological spaces along with some properties. Also we proved some theorem, finally we get a clear idea about on infra topological space.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP66

DATA SCIENCE AND MACHINE LEARNING

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ABSTRACT

Machine learning is indeed shoping the world in many ways beyond imagination.look around yourself and you will find your selves immersed in the world of data science, take Alexa for example, a beautifully build user-friendly Al by none other than Amazon and Alexa is not the only one, there are more such Als like Google assistant, Cortana.

Many have the notion that data science is superset of machine learning well, those people are partly correct as data science is nothing but a vast amount of data and then applies machine learning algorithms, Methods, technologies to these data, therefore, to master data science you should be an expert in mathematics, statistics and also in subject expertise.

As we said that the machine learning could be said to be a subset of data science but a superset of data science but the definition does not end here. A very simple and reasonable machine learning could be the date hind tear with the help of some well-defined algorithms to be able to predict future trends from the data

Key words: Data science, companies, machine learning algorithms

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP67

NUMBER THEORY

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ABSTRACT

Number theory is about the properties of integers. Although integers are familiar and their properties seem simple, number theory is a challenging subject. Number theory has become increasingly important because of its applications to cryptography. Abstract algebra and number theory are broad areas of mathematics which formalize intuitive notions of symmetry, and which explore properties of integers and other closely related number systems. A positive integer p greater than 1 is called prime if the only positive factors of pare 1 and p. A positive integer that is greater than 1 and is not prime is called composite. The fundamental theorem of arithmetic: Every positive integer can be written uniquely as the product of primes, where the prime factors are written in order of increasing size.

The least common multiple of the positive integers a and b is the smallest positive integer that is divisible by both a and b. We denote the least common multiple of a and b by lcm(a, b).

Let a and b be integers, not both zero. The largest integer d such that d | a and d |b is called the greatest common divisor of a and b. The greatest common divisor of a and b is denoted by gcd (a, b).

Key words: Cryptography , Positive integer , Divisible by a and b , Fundamental theorem.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP68

ON THE METHOD OF CONSTRUCTION FOR VEHICLE OIL CONSUMPTION AND EMISSION CONTROL USING COMPLETE BLOCKDESIGNS WITHBIPARTITE AND SPANNING SUBGRAPHS

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ABSTRACT

A complete block design of LSD is constructed and LSD statistical analysis with bipartite and spanning sub graphs. The theory of graphs plays a significant role in mathematical sciences and engineering technologies. In addition, the graph models many relations and processes in physical, biological, social, and information systems. In this paper, on construction of complete block designs are using bipartite and spanning sub graphs through numerical examples.

Keywords*: LSD, Bipartite Graphs, Spanning Sub graphs*

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP69

A STATISTICAL ANALYSIS OF CROSSOVER DESIGN USING GALOIS FIELD THEORY

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ABSTRACT

In this paper, a construction methodology of crossover design using Mutually Orthogonal Latin Squares(MOLS) is discussed. The MOLS have been constructed using the theory of Galois Field(GF). A crossover design is a type of clinical trial where subjects receive multiple treatments in a randomized sequence, rather than being assigned to a single treatment group. The application of this method is explained through an example.

Keywords*: Crossover Design, MOLS, Galois Field.*

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"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP70

ANALYSIS OF BOTH DISCRETE AND LEAKAGE TIME VARYING IN FRACTIONAL-ORDER COMPLEX-VALUED BIDIRECTIONAL ASSOCIATIVE MEMORY NEURAL NETWORK STABILITY

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ABSTRACT

The paper examines the analysis of both discrete and leakage time varying in Fractional-Order Complex-Valued Bidirectional Associative Memory Neural Network Stability in terms of both discrete and leakage temporal variations. These systems' ordering fall inside the interval (1, 2). First, using some analytical methods and basic inequalities, a sufficient condition is derived to guarantee the finite-time stability of systems. The global asymptotic stability of systems based on the Laplace transform, the mean value theorem, the generalized Gronwallin equality, and certain properties of Mittag- Leffler functions is then ensured by obtaining a sufficient condition. Specifically, these acquired requirements are represented as a few algebraic inequalities that are readily computed in real-world settings. Lastly, a few numerical examples are provided to confirm the viability and efficiency of the primary results that were obtained.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP71

FRACTIONAL-ORDER COMPLEX-VALUED NEURAL NETWORKS WITH LEAKAGE AND DISCONTINUOUS DELAYS: STABILITY ANALYSIS

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ABSTRACT

In this dissertation , the problem of Fractional-order complex-valued neural networks with leakage and discontinuous delays: stability analysis is considered. Base on the contracting mapping principle, a sufficient condition is proposed for the existence and uniqueness of the equilibrium point of the addressed neural networks. By employing analysis technique, some delay-dependent criteria are established for checking the global uniform stability of the fractional-order complex-valued neural networks. Two numerical examples are presented to demonstrate the validity and feasibility of the proposed results.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP72

ELECTION OF BEST FARMER IN AGRICULTURE WITH ARTIFICIAL INTELLIGENCE THE USAGE OF DIGRAPH WITH PERMANENT FUNCTION

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ABSTRACT

A graph with everlasting features is applied to evaluate and pick out farmers within the agricultural sector. The key parameters that affect a farmer's manufacturing have been diagnosed via a literature review, and synthetic intelligence has been hired to don't forget the additives highlighted with the aid. In accordance with the additives, an exemplar for deciding on farmers was developed. By making use of the everlasting feature, a directed graph is created to symbolize the attributes that contribute to a farmer's manufacturing quality. The interdependence and inheritance of those attributes had been additionally diagnosed, and a matrix illustration was used to calculate a numerical value of the farmer's quality using a variable, everlasting feature. This method allowed for the improvement of a numerical value that may be used to assess and examine farmers within the agricultural sector.

Keywords: Variable permanent matrix, Digraph, Artificial Intelligence. AMS Mathematics Subject Classification (2020) : 05C90

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP73

A NEW CRYPTOGRAPHIC APPROACH TO IMAGE ENCODING AND DECODING USING THE FUNCTIONAL EQUATION.

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ABSTRACT

This document introduces a novel methodology for encrypting and decrypting digital images using the functional equation as a cryptographic key. The process consists of two phases: encryption and decryption, each utilizing different aspects of the functional equation to maintain image data integrity and confidentiality. The functional equation $2f(x+2y)+f(2x-y)=5f(x+y)+5f(x-y)+15f(y)$. In the encryption phase, the left-hand side (LHS) of the equation transforms the original image into a cipher through mathematical operations that obscure its content, making it unintelligible to unauthorized users. This enhances encryption complexity while preserving properties useful for decryption. The decryption phase employs the right-hand side (RHS) of the equation to reverse the encryption, allowing authorized users to recover the original image. A public-private key pair is established, ensuring that only those with the private key can decrypt the image, thus protecting sensitive information. A key advantage of this technique is its reliance on the unique characteristics of the functional equation, which complicates the relationship between the public and private keys, enhancing security. This complexity makes it difficult for attackers to derive one key from the other, providing strong resilience against common cryptographic threats, including brute force and differential attacks.

Keywords: Cryptography, Encryption, Decryption, Functional Equation.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–202

AP74

A STUDY ON BREAK-EVEN POINT IN OPERATIONS RESEARCH

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ABSTRACT

This paper is on "A Study on Break-Even Point in Operations Research". In the domain of economics and business, the Break-Even Point (BEP) is a point at which cost or expenses and revenue are equal. The purpose of this paper is to calculate the Break-Even Point using Trial and Error Approach, Graphical Approach and Mathematical Approach. Also, we have calculated Break-Even Point in some problems.

Keywords: Break-Even Point, Trial and Error Approach, Graphical Approach,Mathematical Approach.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP75

REAL LIFE APPLICATIONS OF COMPUTATIONAL MATHEMATICS

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ABSTRACT

Computational mathematics plays a pivotal role in solving complex problems across various real-world applications, revolutionizing industries through advanced mathematical models and algorithms. This presentation delves into the real-time applications of computational mathematics, demonstrating its significance in diverse fields such as weather forecasting, healthcare, engineering, finance, artificial intelligence, cryptography, environmental science, biology, space exploration, and robotics.

In recent times, the popularity of mathematics courses has declined, with many students opting for computer science and commerce instead. This is often because students are not fully aware of the real-world applications and immense opportunities that a mathematics education offers. The goal of this presentation is to highlight the broad and exciting career prospects that a strong foundation in mathematics can provide. From shaping modern technologies to driving innovation in diverse sectors, mathematics remains a cornerstone of progress.

By showcasing the real-time applications of computational mathematics, this presentation aims to inspire more students to pursue mathematics courses and recognize the value and versatility of this field. Mathematics offers vast potential for those looking to make a significant impact in both academic and industrial domains, and this presentation will underscore its importance in shaping the future of technology and science.

This presentation will provide a comprehensive overview of how computational mathematics transforms theoretical concepts into practical tools that enhance decision-making and innovation across multiple disciplines.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP76

A METHOD OF DESCRIPTION FOR GRPAH LABELING

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ABSTRACT

Labeling the graph is the most essential method in graph theory, we develop a rule for some graph labeling instead of labeling functions of a graph elements which arrives the same result as in the graph labeling. Labeling is an allotment of digits to the vertex (dots) or edge (lines) or the two under certain conditions, most popular labeling method trace their origin called functions (labeling).

Graph labeling can be used in designing, communication networks, managing databases. This paper represents some applications of labelled graphs of different kinds of labeling along with various kinds of graph serving as models for the application.

Keywords: labeling and graphs

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP77

CODING WITH VERTEX AND EDGE PRODUCT CORDIAL LABELING

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ABSTRACT

A combination of GMJ code, vertex and edge product cordial labeling on sunflower and gear graphs has made the researchers present this paper. Two methods of numbering the alphabets and a method of denoting the numbers differently add weightage to the coding methods provided in this paper.

Securing and Deciphering messages using mathematical operations is the main focus of cryptography. The key challenge is to attain maximum security which may require lengthy mathematical calculations that need lot of power and processing time on the hardware. Additionally, graph theory allows us to take communication and utilize cryptography for transmitting and receiving information.

Key words: GMJ Code, Vertex and Edge Product Cordial Labeling.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP78

SUPERIOR FUZZY SET CORRELATION COEFFICIENTS FOR MULTIPLE ATTRIBUTE DECISION MAKING (MADM) USING INTUITIONISTIC APPROACH

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ABSTRACT

The correlation coefficient between intuitionistic fuzzy sets is an important field of study in intuitionistic fuzzy set theory with an extensive number of practical applications. This paper analyzes the characteristics of intuitionistic fuzzy sets with an emphasis on their increased correlation coefficients. We offer more profound insights into decision-making processes in settings where hesitancy and uncertainty are commonplace by examining the connections between these groups. Additionally, the idea has been used in multiple attribute decision-making (MADM) approaches in intuitionistic fuzzy contexts. These techniques work especially well for issues when characteristics are unknown and have differing degrees of importance. In this case, the correlation coefficients contribute in evaluating the degree of similarity between sets, which is essential for enhancing the precision of MADM techniques. To illustrate the usefulness of this approach in solving many-attribute decision-making problems, an example is given.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP79

NEUTROSOPHIC DAGUM DISTRIBUTIONS: SPECIAL CASES AND APPLICATION IN RELIABILITY ENGINEERING, ELECTRICAL ENGINEERING AND QUALITY CONTROL

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ABSTRACT

A study on neutrosophic Dagum distribution (Nuet Dag) and its family, through explaining its special cases , and relationship with neutrosophic Dagum such as Neutrosophic Dagum Weibull, Neutrosophic Dagum Rayleigh, Neutrosophic Dagum Fréchet, Neutrosophic Dagum exponential are proposed. This study will support us to deal with unclassified or imprecise problems in a supple manner. These problems will comprehend this family of Dagum distributions. These distributions find applications across diverse domains, including reliability engineering, electrical engineering, quality control, and more. They possess unique properties that make them valuable in these fields. For instance, in reliability engineering, the exponential distribution is frequently developed to model the failure number of a system with a constant failure rate. In electrical engineering, the normal distribution might be applied to model random noise in electronic circuits. In quality control, the binomial distribution could be exhausted to perfect the numeral of inadequate items in a sample from production line. Each distribution offers insights and tools for analyzing and understanding various phenomena within these domains.

Keywords: Dagum distribution, neutrosophic Dagum-Weibull distribution, neutrosophic Dagum Exponential distribution, neutrosophic Dagum - Rayleigh distribution and neutrosophic Dagum- Fréchet distributions.

AMS Classification: 62E15, 62F30,62E86,62E17,62H10,62A86, 54A40

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP80

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DIFFERENTIAL EQUATIONS

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ABSTRACT

Differential Equations come into play in a variety of applications such as Physics, Chemistry, Biology, Economics, etc. A differential equation is a mathematical equation that relates some function with its derivatives. In applications, the functions usually represent physical quantities, the derivatives represent their rates of change, and the equation defines a relationship between the two.

In this paper, a forced vibration caused by drag and lift forces with time-varying mass is studied. The construction of the model is conducted by adding impact force to the previous model. The periodicity of the solution is yet known. Hence, the model is seen as a perturbation problem. Since the unperturbed problem has a periodic solution, we applied the averaging method to determine the sufficient condition such that the limit cycle exists.

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP81

COMPARATIVE ANALYSIS OF MACHINE LEARNING TECHNIQUES IN PREDICTING HEART DISEASE WITH ROSE FOR IMBALANCED DATA

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ABSTRACT

Heart disease prediction is crucial for timely intervention and improving patient outcomes. In this study, we analysed a dataset containing two heart disease outcomes—Heart Failure (HF) and Chronic-Ischemic Heart Disease (CIHD)—using three machine learning techniques: logistic regression, decision tree, and random forest. The dataset includes nine clinical parameters: Low-density Lipoprotein (LDL), High-density Lipoprotein (HDL), Triglycerides (TGs), High-sensitive Cardiac Troponin I (hs-cTnI), Haemoglobin (Hb), C-reactive protein (CRP), Serum Creatinine (SC), Aspartate Aminotransferase (AST), and Alanine Transaminase (ALT). Due to class imbalance in the dataset, we employed Resampling by Over-Sampling Examples (ROSE) to improve prediction accuracy. Our results demonstrate that the application of ROSE significantly improved the predictive performance of all models. Feature importance analysis identified the key parameters contributing to the prediction of heart disease. Among the models, random forest exhibited the highest prediction accuracy both before and after ROSE application, suggesting it as the most effective model for this dataset. This study emphasizes the utility of resampling techniques like ROSE in enhancing the performance of machine learning models on imbalanced clinical datasets.

Key Words: Heart disease, Machine learning, Logistic regression , Decision tree, Random forest, Prediction, ROSE

AMS Classification: 62G08, 62J12, 62P12, 62M10, 91B76

2nd ONE DAY INTERNATIONAL CONFERENCE ON
"COMPUTATIONAL MATHEMATICS AND STATISTICS"
(ICCMST–2024)

AP82

OSCILLATION CRITERIA FOR MIDDLE TERM FOURTH-ORDER DELAY DIFFERENCE EQUATIONS

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ABSTRACT

In this paper, I consider the oscillatory behavior of fourth-order delay difference equation with middle term

$$\Delta[s(\zeta)\Delta^3 y(\zeta)] + r(\zeta)\Delta^3 y(\zeta) + t(\zeta) y(\sigma(\zeta)) = 0, \zeta \geq \zeta_0$$

By using the Riccati transformations techniques and new comparison principles, Establish new oscillation results for this equation. An example illustrating the results is also given.

Keywords:

Fourth- order, difference equation, oscillatory solutions, technique of Riccati transformation, comparison theorem.

The moment fixed by the good master is not near
but you shall see the fruit in the future

- Servant of God Michael Ansaldo

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