



NEWSLETTER

संख्या

π SANKHYA

VOLUME 4 (ISSUE 02)

JULY-DEC 2024



DEPARTMENT OF MATHEMATICS

JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY, NOIDA

(DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT 1956)



Insider...

- **Message from the Head of the Department**
- **Message from Editorial Team**
- **Events Organized by the Department**
- **Students' Curricular Activities**
- **Alumni Talks & Interactions : Treasure to Cherish**
- **Research Publications**
- **Ph.D's Awarded**
- **Faculty Achievements : An Epitome**
- **Penned by Faculty Members**
- **tour d'horizon**

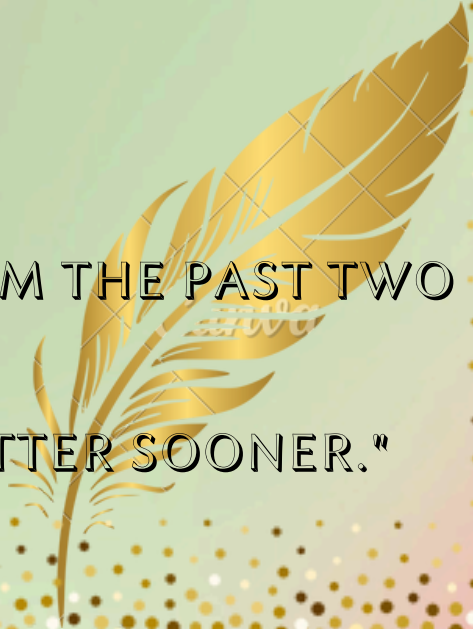


Let's Walk Inside

"SAM BROWNE"

SAID

"IF I COULD CHANGE ONE THING FROM THE PAST TWO
YEARS,
IT WOULD BE STARTING A NEWSLETTER SOONER."



Message from the Head of the Department

I am delighted to welcome you to the latest edition of SANKHYA, our department's newsletter. As we move forward into a new semester, I am excited to share with you some of the remarkable achievements and activities within the Department of Mathematics that have taken place recently.



Prof. Alka Tripathi

Our Department remains committed to fostering a vibrant academic environment where research, teaching, and collaboration thrive. Our faculty members have been actively contributing to cutting-edge research in various branches of mathematics, and our students have consistently demonstrated their brilliance through both academic success and extracurricular participation. Thank you for your continued interest in our work. I hope you enjoy reading this issue of SANKHYA and look forward to all the exciting developments in the months ahead.

With Best Wishes

Prof. Alka Tripathi

Head of the Department of Mathematics

Message from Editorial Team

As we present the latest edition of SANKHYA, we extend our heartfelt thanks to all those who continue to support our journey of exploring and disseminating mathematical knowledge. In this issue, we highlight a range of activities that have been taking place over the past months, we also feature articles from both faculty and students, exploring cutting-edge research, as well as discussions on the latest trends in mathematics education. We hope that you find this edition both informative and inspiring. Your feedback and contributions are always welcomed, as they help us refine and improve SANKHYA. We encourage our readers to engage with us and share your thoughts on the articles or suggest topics for future editions.

Thank you for your continued support, and we look forward to bringing you more exciting content in the next issue.

With warm regards,
The Editorial Board



Dr. Amita Bhagat



Dr. Richa Sharma



Events Organized

“SUCCESS REQUIRES ACTION”

Faculty Development program

“Recent Advances in Optimization: Theory and Practices” (July 15-20, 2024)

The one-week Faculty Development Program focused on “Recent Advances in Optimization: Theory and Practices,” bringing together over 110 participants from across India and featuring expert lectures from both domestic and international speakers. The program aimed to provide a deep understanding of optimization techniques, emphasizing their significance in improving efficiency and achieving optimal outcomes in various fields. Real-world challenges were a key focus, with discussions on operations research applications in industry, particularly in supply chain management.




Organized by
Dr. Neha Singhal
&
Dr. Shruti

National Mathematics Day-2024

Department of Mathematics, Jaypee Institute of Information Technology, Noida celebrated National Mathematics Day on 16th December 2024 to mark the 137th birth anniversary of Prof. Srinivasa Ramanujan, a legendary Indian mathematician. The event was enriched by two insightful expert talks. Dr. Nilam from Delhi Technological University, Delhi, delivered a thought-provoking session on the "Application of Mathematics in Providing Solutions to Real-Life Problems." Dr. Yogesh Gupta from JIIT Noida shared his expertise on "Mathematics and Media," showcasing the interdisciplinary impact of mathematics.



**Organized by
Prof. Pato Kumari
&
Dr. Neha Singhal**



Students' Curricular Activities

“THE MIND IS NOT A VESSEL TO BE FILLED
BUT A FIRE TO BE IGNITED.”

—PLUTARCH



Interactive session on “Emotion Recognition in Conversation” (September 14, 2024)

The interactive session on “Emotion Recognition in Conversation” with Mr. Rajiv Bajpai, Capgemini Invent, Noida, was conducted by the Department of Mathematics in offline mode on September 14 , 2024 at Sec-128 campus. He addressed to students about difficulties in accurately recognizing emotions across diverse conversational settings, including the impact of factors such as language, cultural variations, and contextual nuances.



Faculty In-Charge

Prof. Pato Kumari

Expert talk on Mathematics, Computer, and its Applications in R&D (November 09, 2024)

The interactive session on “Mathematics, Computer, and its Applications in R&D” with Mr. Sudhakar Kumar from ISSA, DRDO, New Delhi, was conducted by the Department of Mathematics in offline mode on November, 2024. In his talk, he discussed how Mathematics provides the foundational tools for modeling complex systems, analyzing data, and optimizing processes, while computer science enables the implementation and simulation of these models on a large scale.




Faculty In-Charge

Prof. Pato Kumari



Alumni Talks & Interactions

“Alumni: Embracing the past,
shaping the present, and inspiring the future.”



Alumni: Dr. Rupali Srivastava

“The Ph.D. Journey: Confronting Challenges and Learning Insights”

(November 13, 2024)

Dr. Rupali Srivastava, a distinguished alumna of the Department of Mathematics at Jaypee Institute of Information Technology, Noida (JIIT), delivered an inspiring talk that captivated the audience. Currently a Senior Research Fellow at JIIT, Dr. Srivastava presented on “The Ph.D. Journey: Confronting Challenges and Learning Insights,” sharing her experiences, challenges, and valuable lessons from her Ph.D. journey in seismic wave modelling in anisotropic layered media.



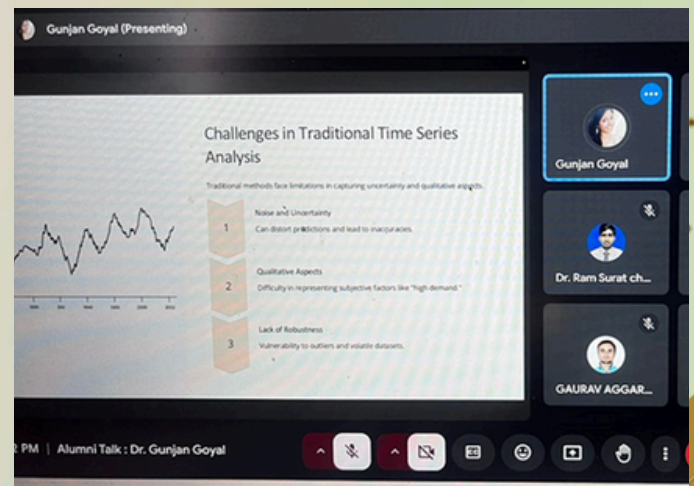
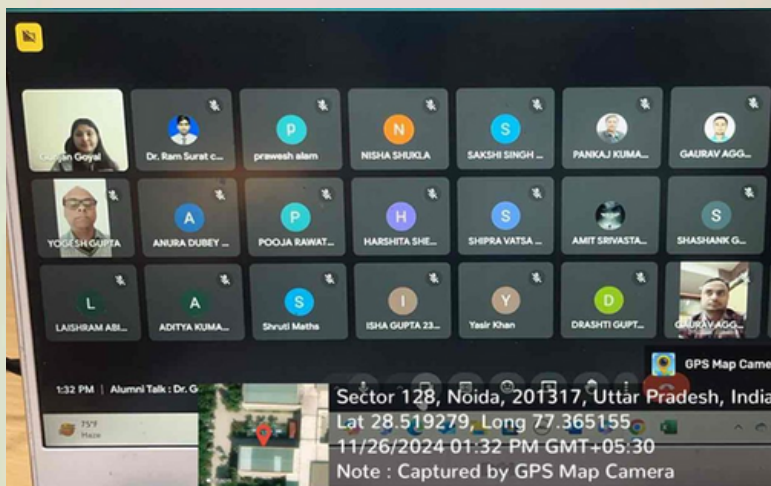
**Organized by
Dr. Dinesh C. S. Bisht
&
Dr. Amita Bhagat**

Alumni: Dr. Gunjan Goyal

“Exploring the Intersection of Fuzzy Logic and Time Series Analysis”

(November 26, 2024)

Dr. Gunjan completed her Ph.D. in Mathematics from IIIT Noida in 2023, where her research focused on the fuzzy time series, heuristic modelling, and their applications in fields such as air quality management and economic forecasting. In her Alumni Talk, titled “Exploring the Intersection of Fuzzy Logic and Time Series Analysis”, Dr. Goyal shared her hard-earned knowledge in the related area. This talk proved valuable for faculty members, current Ph.D. scholars, prospective researchers.



**Organized by
Dr. Dinesh C. S. Bisht
&
Dr. Amita Bhagat**



Research Publications

“RESEARCH IS SEEING WHAT EVERYBODY ELSE HAS SEEN
AND THINKING WHAT NOBODY ELSE HAS THOUGHT.”

— **ALBERT SZENT-GYÖRGYI**



Journal Publications

- S. R. Chakravarthy, S. Ozkar, and Shruti, "Analysis of blockchain system based on BMAP/P_H[b]/1 queueing model," J. Supercomput., vol. 80, pp. 23815–23847, 2024.
- Agrawal, A., Singhal, N. An efficient computational approach for basic feasible solution of fuzzy transportation problems. Int J Syst Assur Eng Manag 15, 3337–3349 (2024).
- S. Kumar, D. Bisht, and A. Jain, "An Anchor-Aware Graph Autoencoder Fused with Gini Index Model for Link Prediction," SN COMPUT. SCI., vol. 5, no. 6, p. 745, Jul. 2024
- Ajay K. Agrawal, Y. Gupta, Analytical solution to boundary layer flow and convective heat transfer for low Prandtl number fluids under the magnetic field effect over a flat plate, Heat Transfer, Volume 53, Issue 6, 3054-3071 (2024).
- V. Ghlawat, R. Sharma and K. Alam, Creep Stress Analysis of Transversely Isotropic Rotating Disc Composed of Piezoelectric Material, International Journal of Mathematical, Engineering and Management Sciences, Vol. 9, pp.1185-1197, 2024.
- S.D. Kharabe, B. Bundela, M. K. Bansal and G.S. Paliwal, Pathway Fractional Integral Formulas Associated with the Incomplete κ -Functions, Journal of China University of Mining and Technology, Vol. 29(3), pp. 218-223, 2024.



Journal Publications

- **Srivastava, P. K., Bisht, D. C., Chhibber, D. & Ram, M., An ingenious approach to optimize a special class of transportation problem in uncertain environment. International Journal of System Assurance Engineering and Management, 15(8), 3585-3595, (2024).**
- **Rama Shanker, Kamlesh Kumar Shukla. The Poisson-Uma Distribution with Properties and Applications to Model Thunderstorm Events. Research & Reviews : Journal of Statistics. 2024; 13(01):20-30.**
- **Mohammad Prawesh Alam, Arshad Khan, and Pradip Roul. High-resolution numerical method for the time-fractional fourth-order diffusion problems via improved quintic B-spline function. Journal of Applied Mathematics and Computing (2024): 1-39.**
- **P. Shahi, Polynomial Contractions in G-metric spaces, Letters in Nonlinear Analysis and its Application, Vol. 1 No. 3 (2024), 138-148.**
- **S.D. Kharabe, B. Bundela and M. K. Bansal, A Set of Integrals Associated With the Incomplete κ -Function, Multi-Index Bessel Maitland Function and Jacobi Polynomial, African Journal of Biological Sciences, Vol. 6(6), pp.8754-8763, 2024.**

Journal Publications

- P. Rana, N. Shukla, S. Areekara, and I. Pop, "Multiple solutions and temporal stability for ternary hybrid nanofluid flow between non-parallel plates with entropy generation analysis," ZAMM - J. Appl. Math. Mech. Z. Für Angew. Math. Mech., vol. 104, no. 12, p. e202400124, 2024.
- Richa Sharma, Vikash Ghlawat, Zoran Radaković, Khursheed Alam, Creep Stress Analysis of Functionally Graded Transversely Isotropic Piezoelectric Disc with Variable Thickness Under Rotation, Structural Integrity and Life, Vol. 24, No.2 (2024), pp. 179–186.
- Vikash Ghlawat, Devinder Singh Pathania, Richa Sharma, Arvind Kumar, Khursheed Alam, Evaluation of Thermal Stresses in Transversely Isotropic Piezoelectric Disc with Rotation and Internal Pressure, Structural Integrity and Life, Vol.24, No.2 2024, pp. 172–177.
- Nisha Sharma, Sumit Kaur Bhatia, Shashank Goel, Dharmendra Kumar, Economic impact of epidemics: mathematical model and dynamical analysis, Commun. Math. Biol. Neurosci., 2024 (2024)



Journal Publications

- **Kulshrestha, R., Goel, S. & Balhara, P. Dependability-Based Analysis for Spectrum Sensing and Spectrum Access in Cognitive Radio Networks with Heterogeneous Traffic. Wireless Pers Commun 139, 2285-2324 (2024)**
- **Richa Sharma, Zoran Radaković, Fracture Analysis in an Orthotropic Rotating Hyperbolic Disc Fitted with Stiff Rod, Structural Integrity and Life, Vol. 24, No.3 (2024), pp. 339-345.**
- **Richa Sharma, Anshu Nagar, Analytical Solution of Stresses in Isotropic Disc Composed of Functionally Graded Material with Variable Compressibility and Thickness, Structural Integrity and Life, Vol. 24, No.3 (2024), pp. 330-336.**
- **Y. Singh and D. C. S. Bisht, "Enhanced dissimilarity measurement for pythagorean fuzzy sets in real-world scenarios," Int J Syst Assur Eng Manag, Dec. 2024**
- **Thangaraj, C., Valarmathi, R., Easwaramoorthy, D., Kumar, D. R., Chamola, B. P., Generation of Fractal Attractor for the Controlled Metric Based Dynamical Systems, Contemporary Mathematics, Volume 5, Issue 4, 2024, 6165-6168.**
- **Sharma, D., Bisht, D. C., & Srivastava, P. K. Solution of fuzzy transportation problem based upon pentagonal and hexagonal fuzzy numbers. International Journal of System Assurance Engineering and Management, 15(9), 4348-4354 (2024).**



Conference Proceedings

- **Rachna Jain, Lipika Goel, Mayank Sharma, and Amit Srivastava. 2024. Projection Based Clustering of n -Dimensional Data in Tangential Space: A Belief Measure. In Proceedings of the 2024 Sixteenth International Conference on Contemporary Computing (IC3-2024). Association for Computing Machinery, New York, NY, USA, 289–297.**
- **S. Kumar, A. Jain, and D. Bisht, “Ant Colony Optimization for Link Prediction in Online Social Networks: A Swarm Intelligence Approach,” in Proceedings of the 2024 Sixteenth International Conference on Contemporary Computing, Noida India: ACM, Aug. 2024, pp. 632–641.**



Ph.D's Awarded



‘Pain Is Temporary,
But...A Doctorate Degree Is Forever’



Ph.D's Awarded

Manpreet Kaur (19408011)

Topic: A Study of Information Fusion Processes in Probabilistic and Evidential Frameworks using Information Theoretic Techniques



Rohit Goel (19408005)

Topic: B-Splines Collocation Simulations of Some Reaction-Diffusion Virus Epidemic

Vishal Gupta (17408001)

Topic: Thermal Stability Analysis and Neural Network Prediction in Rayleigh Benard Nanofluid Problems





Faculty Achievements

Great achievement is usually born of great sacrifice,
and is never the result of selfishness.

-NAPOLEON HILL



The Epitome

**Dr. Lakhveer Kaur is listed in the
"World Top 2% Scientists-2024"
announced by Elsevier and Stanford University,
United States.**



**Dr. Lakhveer Kaur
Associate Professor
Department of Mathematics, IIIT, Noida**

Published: 16 October 2024, Version 7

<https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/7>

**Department Congratulates Dr. Lakhveer Kaur for
her achievements via this Newsletter.**



Penned by Faculty Members

“The pen is the tongue of the mind.”

-HORACE



Innovating Education: The Synergy of Flipped Learning and Beyond the Classroom Techniques

The realm of knowledge possessed by humans is expanding rapidly with each passing decade. Today, we stand at the tipping point where there is need for innovative educational methods to make our students learn. The flipped learning and beyond the classroom teaching-learning pedagogies are hot favourites among emerging pedagogical strategies. These methods have already been tried and tested with promising results. But before delving into what a flipped classroom is and how it has the potential to be revolutionary, let us reflect on the origins of 'education'. It's been almost 300,000 years since mankind mastered fire, marking a pivotal moment in our evolution. Since then, our progress has been remarkable, from survival in the wild to harnessing nuclear power to splendidly placing a foot on the moon; we have undoubtedly come a long way.



Prof. Goldie Gabrani

How were we able to pull off this incredible feat?

The heaps of information that we sit upon today are utterly sacred to their core. These have been built by the toil of generations of researchers, inventors, scientists, explorers and adventurers who dared to venture against the norms, out into the unknown, only to find what lies beyond the horizon. It is due to this precious knowledge that the same species that was dumbfounded by fire can understand and control nuclear fission reactions. The first sailors who sailed on hollowed tree trunks would be awestruck by modern spaceships. But here the question arises-

Why such rhetoric for some novel topic related to education?

It is quite simple— Education today goes beyond mere survival; it is about exploration and discovery, which is the unquestionable soul of education. The purpose of learning, which was once passive and defensive survival, has changed. It is a big responsibility on our shoulders to devise ways to transfer our knowledge effectively to the next generation so that they assimilate it and also a spark of innovation is ignited in them.

Think about the iconic story of an apple falling on Newton's head, which introduced him to gravitation. Or Archimedes uncomfortably lying in his bathtub realizing buoyancy operating for the first time. The early humans who first witnessed phenomena like fire many years ago or the Neolithic people who saw hollow trunks float on water.

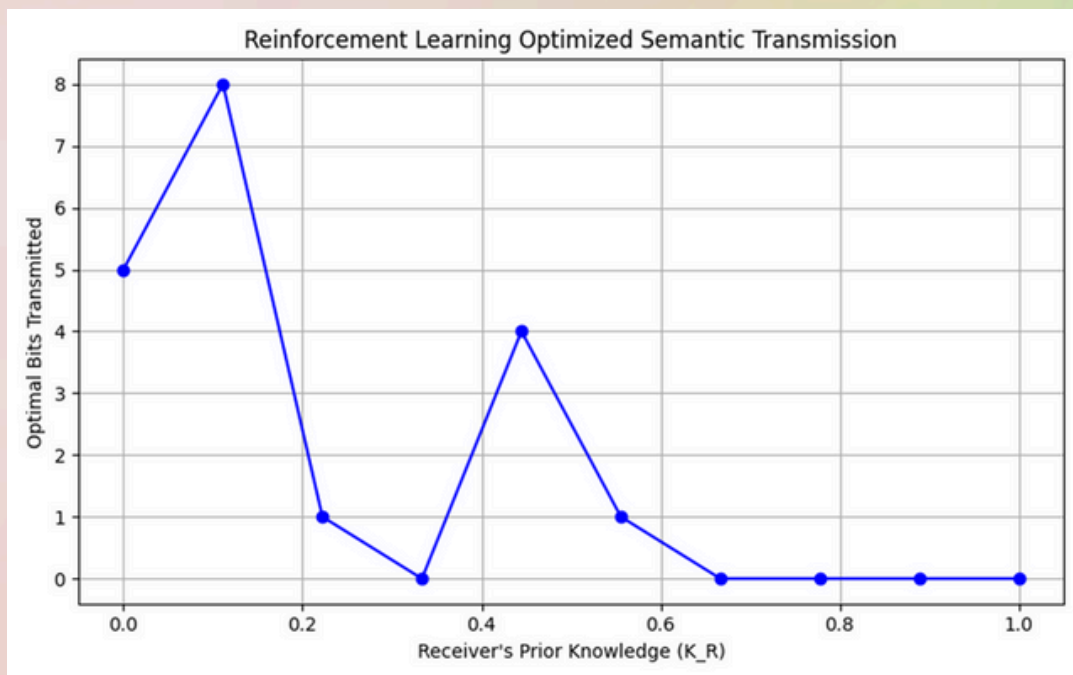
Observing these examples, we realize that many famous figures unknowingly used these concepts long ago. The difference now is that we have recognized them and are actively incorporating them into our educational system. Flipped learning and beyond-the-classroom training are indeed innovative tools that can be put to practical use to complement and transform the traditional pedagogical landscape.

Cognitive semantic Communication: A Concise Overview

Cognitive Semantic Communication (CSC) is an advanced communication paradigm that integrates cognition, semantics, and intelligent reasoning into traditional communication systems. Instead of just transmitting raw bits (as in conventional communications), CSC focuses on the meaning (semantics) of the transmitted information and how effectively it contributes to the receiver's goal. Key concepts of CSC include usage of knowledge graphs, embeddings, or deep learning models (e.g., transformer-based NLP models) to encode meaning efficiently, prioritizing information based on relevance to the receiver's task, using machine learning and reasoning to infer missing information, reducing redundant transmission by predicting what the receiver already knows, using Reinforcement Learning (RL) for efficient communication strategies and many more. .



Prof. Amit Srivastava

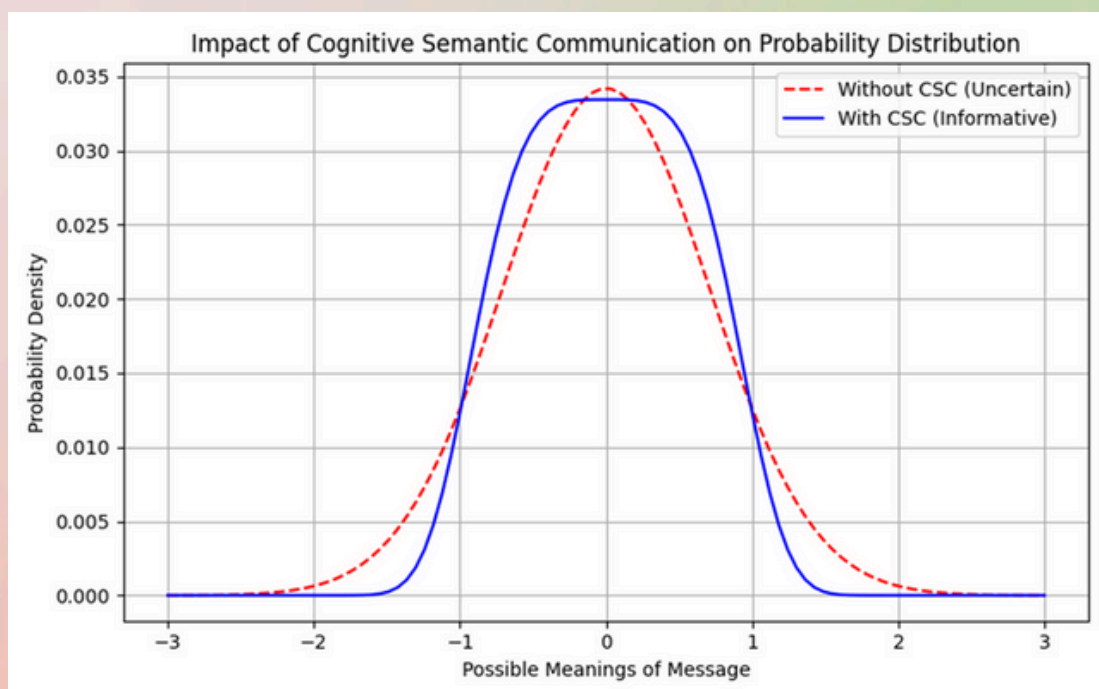


Cognitive semantic Communication: A Concise Overview

We can use probability distributions to formalize Cognitive Semantic Communication (CSC) by modeling how semantic meaning is transmitted and inferred in a noisy environment. In classical communication, we transmit a signal X over a channel with noise N , and the receiver reconstructs Y . The probability distribution $P(Y/X)$ represents how likely the received message Y is, given the transmitted message X . Now, instead of transmitting raw symbols, we transmit semantic information S , which is meaningful in the receiver's cognitive context. The receiver reconstructs inferred meaning S^* . The key difference is that the probability distribution given as $P(S^*/S, KR)$ now represents how well the receiver understands the meaning, given both the transmission and prior knowledge where S denotes the semantic content of the message, S^* denotes the receiver's inferred meaning and KR denotes the receiver's prior knowledge (context, past data, knowledge graphs). Instead of just transmitting S , one optimizes for the probability that the receiver correctly infers the intended meaning with minimal transmission i.e. one considers

$$\text{Maximize } P(S^* = S / X, KR)$$

The above means that if KR is high, fewer bits are needed (more reliance on context). If KR is low, more explicit data must be transmitted. If the goal is task completion, then only the most relevant semantic information is transmitted. The associated figure shows the simulation results of an RL-based semantic communication system, where a sender decides how much information to transmit, optimizing for minimal bandwidth while ensuring correct inference at the receiver. It is clear that high KR needs fewer bits to be transmitted and vice versa. There will be no transmission if the receiver can infer meaning correctly. It is clear that Cognitive Semantic Communication (CSC) can enhance a probability distribution by reducing uncertainty in inference, encoding meaning more efficiently using prior knowledge and making probability distributions more concentrated around meaningful outcomes



Poem: The Language of the Universe

From numbers carved in ancient lore,
To secrets locked behind a door,
Math stands tall—a guiding light,
A silent force, both sharp and bright.

In codes and ciphers, math prevails,
Encrypting whispers, masking trails.
Prime numbers dance, a hidden key,
To guard our world in secrecy.

From networks vast to profits high,
Math finds the path where least costs lie.
With graphs and bounds, it shapes the way,
For faster routes and brighter days.

Rivers twist and currents churn,
Equations map the way they turn.
From air to oil, from blood to seas,
Math unlocks their mysteries.

Inside the heart, the veins, the brain,
Math predicts the joy and pain.
From scanning cells to mapping genes,
It builds the bridge to health unseen.

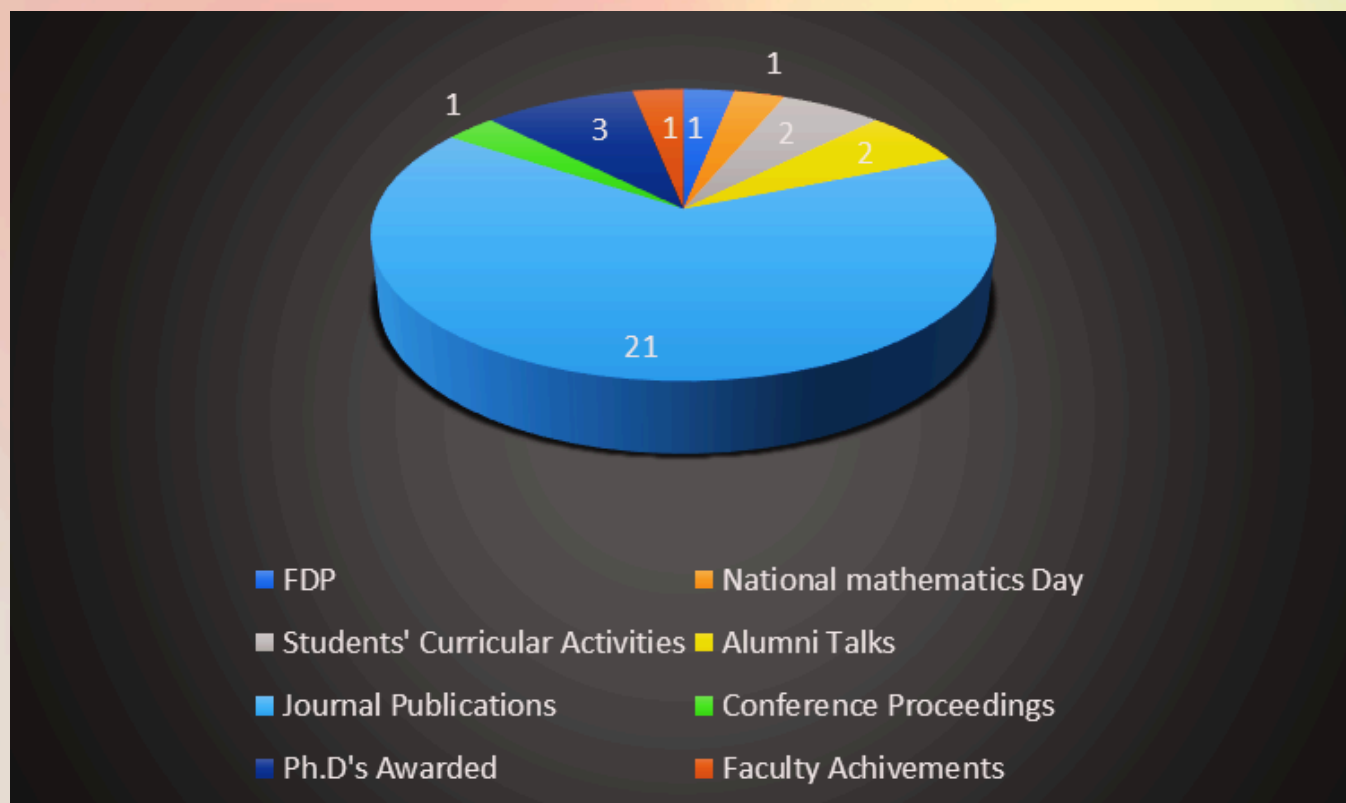
In space, in time, in sound, in light,
Math threads through both day and night.
A hidden pulse, a steady tune,
That shapes the world, from sun to moon.

So as we build, explore, create,
Math remains our trusted fate.
A timeless guide, both vast and true,
Its power fuels the world we view.



Dr. Shikha Pandey

tour d'horizon : (Jul-Dec) 2024

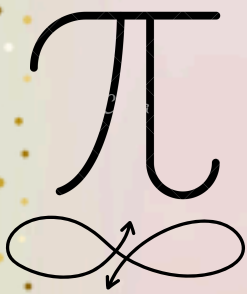


Thanks to everyone who directly or indirectly helped in producing these numbers with their determination and hardwork. We are grateful that we are in NEWS.

-Editorial Team



Scan for the feedback form



SANKHYA संख्या

VOLUME 4 (ISSUE 02)

JULY-DEC 2024

DEPARTMENT OF MATHEMATICS

JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY, NOIDA

(DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT 1956)