

Mehta Family School of Data Science and Artificial Intelligence
Indian Institute of Technology Guwahati

Understanding, Building and Sharing Intelligence since 2021

https://www.iitg.ac.in/dsai/

Artificial Intelligence Confluence

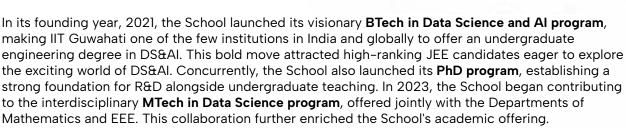
27-28th Dec 2024 at the Indian Institute of Technology Guwahati

Since its inception in April 2021, the Mehta Family School of Data Science and Artificial Intelligence, IIT Guwahati, has been dedicated to offering cutting-edge education programs in data science (DS) and artificial intelligence (AI), while advancing R&D to translate DS & AI innovations from the laboratory to real-world applications.

Mehta Family School of Data Science and Artificial Intelligence Indian Institute of Technology Guwahati

In three years, the School has built a robust faculty pool with over 20 members. Among them, 9 are core faculty members who have demonstrated exceptional research capabilities through their PhDs, post-doctoral work, and industry R&D experience in Data Science and AI (DS&AI) before joining the School. Additionally, the School benefits from 15 associate faculty members who primarily belong to other departments at IIT Guwahati, such as EEE, Mathematics, CSE, BSBE, Chemical Engineering and Physics. These associate faculty members add an interdisciplinary dimension to the courses taught and the R&D pursued by the School.

In its founding year, 2021, the School launched its visionary BTech in Data Science and Al program, making IIT Guwahati one of the few institutions in India and globally to offer an undergraduate the exciting world of DS&AI. Concurrently, the School also launched its PhD program, establishing a to the interdisciplinary MTech in Data Science program, offered jointly with the Departments of Mathematics and EEE. This collaboration further enriched the School's academic offering.





In October 2023, the School added another feather to its cap with the launch of the online BSc (Hons.) in DS&Al program. This fully online degree program aims to make world-class DS&AI education accessible and affordable globally. The program features flexible course content designed by our faculty and caters to a diverse group of learners from different ages, geographies, and professional backgrounds. The program offers multi-entry as well as multi-exit options and campus immersion opportunity to the learners.

On the R&D front, the School conducts research on a wide range of topics, including capturing, modeling, and predicting data. Our goals span from understanding fundamental science to engineering practical solutions. Applications of our research include strength prediction in civil engineering structures, robust communication in mobile edge computing systems, ethical Al use in healthcare, human face and hand gesture recognition, spoken language recognition and understanding, real-world visual field processing and recognition, reliability testing using ML models, time-series data analysis, generative Al and more. We regularly engage in publishing our findings in journals and conferences, and also reach out to the public through our outreach interactions!

About U

Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology Guwahati The confluence will be a celebration of developments in data science and AI, combining academic, technical, and cultural activities!





Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology Guwahati

Where Data meets Intelligence, and Innovation Takes Flight



bout the Confluence

Unleashing Talent and Innovation

The Al Confluence serves as a premier platform for our undergraduate and postgraduate students to showcase their knowledge, projects, and research in data science and Al. We aim to cultivate academic excellence and foster collaborative learning by connecting on-campus and off-campus learners with peers, faculty, and esteemed expert guests. This engagement also seeks to expand career opportunities by bridging academic pursuits with impactful professional roles.

Fostering DS&AI Awareness

Featuring technical sessions with leading experts from academia, industry, and government, the event includes talks and panel discussions designed to inspire, educate, and promote knowledge-sharing in the ever-evolving field of Data Science and Artificial Intelligence.

Catalyzing Technological Innovation

By showcasing the School's breakthrough achievements and forward-thinking initiatives, the event aims to illuminate the transformative potential of Data Science and Artificial Intelligence. Through dynamic brainstorming sessions, we will explore cutting-edge challenges and engineer innovative Al-driven solutions that push the boundaries of technological possibility.

Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology, Gunabati



Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology, Guwahati





Al in Biometrics - Solving Billion-Scale Identity Challenges in India







Arka Koner

Chetan Naik

Data Science Architects. UIDAI Tech Centre, Bengaluru

IIT Guwahati

Artificial Intelligence Confluence

27-28th Dec 2024

As the largest biometric identity program in the world, Aadhaar has revolutionized how identity verification is conducted at scale in India. With over a billion enrollments, managing and ensuring accuracy, speed, and scalability in biometric systems is a monumental challenge. This talk will explore how AI and deep learning are transforming biometric solutions, enabling fingerprint, face, and iris-based matching at unprecedented scale and reliability.

We will discuss the AI innovations that power UIDAI's biometric matching infrastructure, including advancements in Face Recognition Systems, Fingerprint and Iris Matching to improve matching success rate and user's experience for diverse population. The session will highlight the development of our Indigenous ABIS (Automated Biometric Identification Systems) to prevent duplicate identities, powered by state-of-the-art deep learning models and cutting-edge engineering solutions. Through real-world case studies, we will demonstrate how Al-driven solutions enhance accuracy, detect fraud, and enable secure, inclusive identity verification at scale, positioning UIDAI as a global leader in biometric identity systems for over 1.4 billion people.

> Venue: Bhupen Hazarika Auditorium Time: 11 am - 11:45 am, 27th Dec

at IIT Guwahati

Mehta Family School of

Data Science & **Artificial Intelligence**

Indian Institute of Technology Guwahati

About the Speakers

Arka Koner, leads AI and data science initiatives at UIDAI as a Data Science Architect, playing a key role in designing and deploying scalable AI solutions for biometric projects like fingerprint authentication, spoof detection, and Indigenous ABIS, enhancing the security and efficiency of India's digital identity systems.

Chetan Naik, as Data Science Architect at UIDAI, plays a pivotal role in multiple Al initiatives and drives advancements in face and iris authentication, as well as Indigenous ABIS, to deliver scalable, secure, and Al-driven biometric solutions for India's digital identity systems.

Machine Learning in Chemical Space – Where do we stand?



Hridoy Jyoti Mahanta, PhD Head, Advanced Computation and Data Sciences Division, CSIR North East Institute of Science and Technology, Jorhat, Assam

Artificial Intelligence (AI) and Machine Learning (ML) have made immense contributions in solving complex problems of natural sciences. In molecular discovery, the most crucial step is to identify or prioritize the potential candidates from a large space of molecules for computational study or synthesis and characterization. This is guite challenging as the size of the chemical space is projected to be between 1020 and 1060 while the number of compounds that have been synthesized is in the order of 108. Our group has mined ≈ 150 million molecules to create a space that has been structurally classified. This large library has the potential to decode many drug discovery problems using AI & ML. As such, we have developed several ML models to address fundamental problems such as antiviral potency, success/failures in clinical trials, oral absorptions, etc. Besides, in building the chemical space, we have also explored the phytochemicals space of medicinal plants of Northeast and PAN India leading to the development of indigenous databases. The quest continues to identify and address both basic and applied problems covering inter-disciplinary areas.

IIT Guwahati

Artificial Intelligence Confluence

27-28th Dec 2024 at IIT Guwahati

Mehta Family
School of
Data Science &
Artificial Intelligence

Indian Institute of Technology Guwahati Venue: Bhupen Hazarika Auditorium Time: 12 noon - 12:45 pm, 27th Dec



About the Speaker

Dr. Hridoy Jyoti Mahanta holds a PhD in Computer Science and Engineering from Assam University, Silchar. He started his academic career in 2018 as Assistant Professor in Assam Don Bosco University, Guwahati. In 2020, he joined CSIR North East Institute of Science and Technology, Jorhat as a Scientist in the Advanced Computation and Data Sciences Division. There he worked in the research group of Prof. Narahari Sastry, a renowned Chemist and the then Director of the institute and currently a Professor at IIT Hyderabad. After joining Prof Sastry's group, Dr Mahanta had a shift in his career and started working on applications of Artificial Intelligence, Machine Learning and Deep Learning in areas of Cheminformatics, Bioinformatics, Computational chemistry, Mathematical modelling, software development, database development etc. with special focus on the North East. After Prof. Sastry left the institute, Dr Mahanta led the group as the head of the Advanced Computation and Data Sciences Division.

Neuromorphic Computing and Intel Loihi 2



Sumedh R. Risbud, PhD
Research Scientist, Neuromorphic
Computing Lab, Intel

IIT Guwahati

Artificial

Intelligence Confluence

27-28th Dec 2024 at IIT Guwahati

Mehta Family
School of
Data Science &

Artificial Intelligence
Indian Institute of Technology

The term "neuromorphic computing" is interpreted in various ways by different people. I will discuss our view on the matter from the perspective of the Intel Loihi architecture. I will also present an overview of the results obtained using Loihi and Loihi 2 chips. If time permits, we will take a brief look at the architecture of the chips as well as some details about how to engage with the Neuromorphic Community built around Loihi.



Venue: Bhupen Hazarika Auditorium, Time: 2:30 pm - 3:15 pm, 27th Dec

About the Speaker

Sumedh R. Risbud is a Senior Neuromorphic Algorithms Scientist at the Neuromorphic Computing Lab in Intel Labs, with almost a decade-long experience at Intel. He obtained his Ph.D. in fluid mechanics from the Johns Hopkins University and did his postdoctoral research at MIT. He obtained his B.Tech. and M.Tech. from IIT Bombay in Chemical Engineering. He can be described as a Chemical Engineer with scientific and R&D expertise in mathematical modelling in general. His research interests and expertise lie in the areas of Neuromorphic Computing, Statistical Physics, Fluid Mechanics, Soft Matter Physics, Colloid and Interfacial Science, Computational Biology by the way of Protein Structure Analysis and Prediction, and a little bit of Computational Neuroscience.

Guwahati

Demystifying Large Language Models for Text, Speech and Vision



Sriram Ganapathy, PhD
Associate Professor, IISc
Bangalore; Visiting Research
Scientist, Google Research India

In the last two years, large language models (LLMs) have taken giant leaps in tackling real world problems ranging from reasoning, coding, creative content generation and multimodal understanding. This has resulted in significant user growths in services like chatGPT and Gemini. In this talk, I will give a brief overview of i) what goes under the hood in developing these models, ii) what their current capabilities are, iii) who are the big players and iv) what are the potential challenges and blindspots. Along the way, I will also touch upon some of the theory that allows basic understanding of how the LLMs achieve their capabilities. The talk will end with a discussion of bias, safety and regulatory considerations in the development and deployment of these models.

IIT Guwahati

Artificial Intelligence Confluence

27-28th Dec 2024 at IIT Guwahati

Mehta Family School of Data Science & Artificial Intelligence

Indian Institute of Technology Guwahati



Venue: Bhupen Hazarika Auditorium, Time: 10:00 am - 10:45 am, 28th Dec

About the Speaker

Sriram Ganapathy is an Associate Professor at the Electrical Engineering, Indian Institute of Science, Bangalore, where he leads the activities of the Learning and Extraction of Acoustic Patterns (LEAP) lab. He is also a visiting research scientist at Google Research India, Bangalore. Prior to joining the Indian Institute of Science, he was a research staff member at the IBM Watson Research Center, Yorktown Heights, USA. He received his Doctor of Philosophy from the Center for Language and Speech Processing, Johns Hopkins University. He obtained his Bachelor of Technology from College of Engineering, Trivandrum, India and Master of Engineering from the Indian Institute of Science, Bangalore. He has also worked as a Research Assistant in Idiap Research Institute, Switzerland. Dr. Ganapathy currently serves as the IEEE Sigport Chief Editor, member of the IEEE Education Board, and functions as subject editor for Elsevier Speech Communication Journal. He is also a recipient of multiple awards including Department of Science and Technology (DST) Early Career Award in India, Department of Atomic Energy (DAE), India Young Scientist Award and Verisk AI Faculty Award.

Understanding the Earth from Space with Machine Learning for Social Good



Ujjal Kr. Dutta, PhDManager, Data Science
SatSure Analytics

Artificial Intelligence Confluence

27-28th Dec 2024 at IIT Guwahati



Mehta Family School of Data Science & Artificial Intelligence

Indian Institute of Technology Guwahati In an era where the challenges of climate change and environmental degradation are increasingly pressing, the integration of machine learning with Earth observation (EO) technologies offers transformative potential for social good. This talk explores how advanced machine learning techniques can harness vast datasets from satellites and other sources to enhance our understanding of the Earth and address critical societal issues.

Building on previous explorations of self-supervised learning in remote sensing and the application of machine learning in agricultural monitoring, we delve into innovative methodologies that leverage EO data for impactful solutions. We will discuss how self-supervised learning can be employed to extract meaningful insights from complex satellite imagery, enabling effective monitoring of environmental changes and natural resources.

Moreover, we will highlight case studies that demonstrate the successful application of machine learning in diverse areas such as disaster response, urban planning, and agricultural sustainability. By addressing unique challenges posed by varied geographies and climatic conditions, these approaches not only improve data accuracy but also empower communities to make informed decisions based on actionable insights.

This presentation aims to inspire collaboration among researchers, practitioners, and policymakers to harness the power of machine learning and EO technologies for social good, ultimately contributing to a more sustainable and resilient future for our planet.

Venue: Bhupen Hazarika Auditorium, Time: 10:45 am - 11:30 am, 28th Dec

About the Speaker

Dr Ujjal Kr Dutta is a Manager, Data Science at SatSure Analytics, where he leads efforts in satellite remote sensing, machine and deep learning, to deliver actionable insights across various sectors, such as agriculture, climate, infrastructure, finance, etc. Prior to this, he has worked as a Staff Research Scientist-Manager at Dolby Research Labs, and as a Lead Data Scientist at Myntra (Flipkart-Walmart Group). He has held positions / collaborated with institutions such as University College London, National University of Singapore, MBZUAI, Monash University, IIT Madras, and IIT Guwahati. He obtained his PhD from the Department of Computer Science and Engineering at IIT Madras, where he worked with Dr Chandra Sekhar C, along with Dr Mehrtash Harandi from Monash University/ Data61-CSIRO.

His research interests lie primarily in applied machine learning, while spanning across representation, semi-/self-supervised learning, domain generalization and incremental learning, graph/subspace clustering, differential geometry, Physics-Informed Neural Networks, model compression, object detection, image segmentation, sequential models, etc. He has 17+ publications across AAAI, NeurIPSw, ECCVw, ICASSP, IEEE TAI, etc, and also reviews regularly for the mainstream conferences (ICLR, ICML, CVPR, ECCV, etc) and journals (IEEE TNNLS, IEEE TGRS, etc). He is also a recipient of the Myntra AIM HIGH Award, IBM Best PhD Thesis Award, and IITM Institute Research Award. In addition to his academic and professional achievements, he is an accomplished athlete, with various medals in Olympic-style Weightlifting, Powerlifting, including an Inter-IIT silver medal, and four-times Strongman at IIT Madras.

Wildlife of North East and conservation initiatives



Parimal C.
Bhattacharjee, PhD
Retd. Prof. Gauhati University

Artificial
Intelligence
Confluence

27-28th Dec 2024 at IIT Guwahati North East India is 262, 179 km², with 8 states, 8% of land area, 3.8% population of India, and has 98% of the border International, shared with China, Bhutan, Myanmar and Bangladesh. This area is the meeting ground of the Indo-Malayan, Afro-tropic and Indo-Chinese bio-geographical realms as well as the Himalayan and Peninsular Indian elements. With two biodiversity hotspots, the region is recognized as refugium of flowering plants and centre of active speciation. Landscape has different altitudinal gradient, climatic individuality, geographical location in global context, river networks, plains and hill mosaic. The large number of indigenous communities covered the area with unique cultural landscape and are the custodial of tractional knowledge and wisdom. The unique wildlife of the region, with a number of them being endemic and endangered species, from large mammals, avifauna, herpetofauna to pollinators and invertebrate are the jams and jewels and nuts and bolts of nature.

There seems to be enormous opportunities of the application of AI in conversation of wildlife and possibly elevate to a precise, cost effective and efficient wildlife conservation. It will also lead to the proper understanding of the role of wildlife in ecosystem services offered for the benefit of human being.



Venue: Bhupen Hazarika Auditorium Time: 12 noon - 12:45 pm, 28th Dec

About the Speaker

Prof. Parimal Chandra Bhattacharjee is a distinguished academic and retired Professor from Gauhati University, where he served since 1970. Renowned for pioneering wetland studies, primatology, and biodiversity research in North East India, he has significantly contributed to the understanding and conservation of the region's unique ecological heritage. Prof. Bhattacharjee has been an active member of various governmental and state committees on wildlife conservation, including the National Biodiversity Authority (NBA), State Biodiversity Board (Assam), State Wildlife Board (Assam), and the Regional Empowered Committee (North East) under the Ministry of Environment, Forest, and Climate Change (MoEFCC). He also served as Director of the Vivekananda Khestra Institute of Culture and is currently the Trustee and Vice-Chairman of the Wildlife Trust of India. Beyond academia, Prof. Bhattacharjee is an accomplished sportsperson, having played state-level cricket and served on the State Ranji Trophy Selection Committee. He was also the founding Treasurer of the Zoological Society of Assam. Under his guidance, numerous students have obtained their PhDs, furthering his legacy in wildlife research and conservation. Prof. Bhattacharjee retired in 2006 but continues to dedicate his expertise to advancing biodiversity conservation in India.

Mehta Family
School of
Data Science &
Artificial Intelligence

Indian Institute of Technology Guwahati

Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology, Guwahati





Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology, Guwahati

Lightning Talks5 Mins Each

by PhD Scholars





Anupam Kumar, PhD Scholar Topic: Enhancing Reasoning in Large Language Models



Kamal, PhD Scholar Topic: Vision-Based Hand Function Assessment and Rehabilitation



Tanmoy Mandal, PhD Scholar Topic: Is Your Data Secure? - Towards Post-Quantum Privacy



Pallapu Mohan Krishna, PhD Scholar Topic: From Signs to Speech: Al in Sign Language Recognition and Translation



Rahul Bhardwaj, PhD Scholar Topic: From Segmentation to Diagnosis: Al's Role in Medical Imaging



Omendra Gangwar, PhD Scholar
Topic: Bayesian Inference for Modeling Time-Varying Non-Linear Signals



Prakhar Kumar Sonkar, PhD Scholar Topic: Listening to Lungs: Al in Respiratory Disease Detection



Kartikay Agrawal, PhD Scholar Topic: Neural Decision Trees

Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology, Guwahati





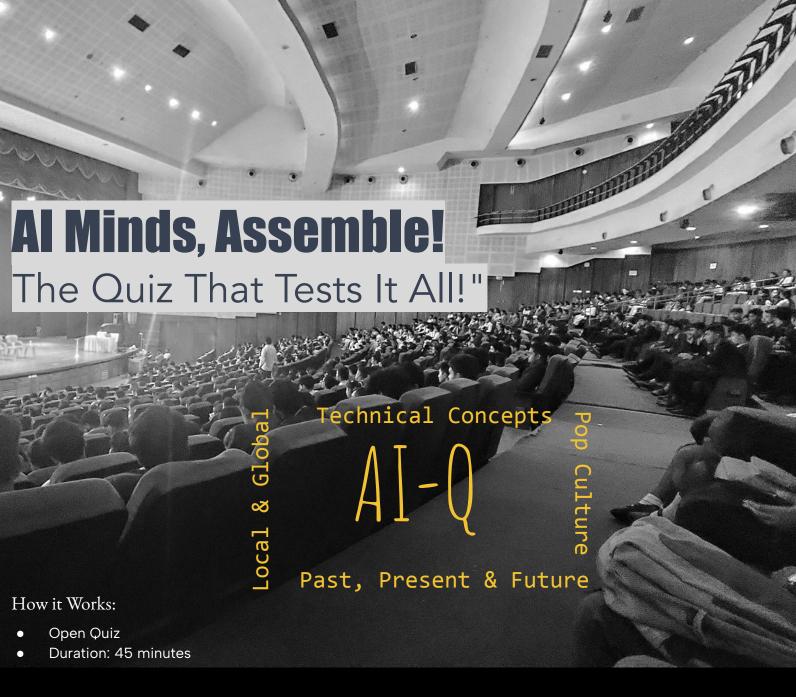
AI in India: Catalyst for **Growth or Chaos?**



Will AI propel India toward unparalleled progress, or will it disrupt societal

balance and economic stability? Join the debate as we explore the dual-edged impact of AI on India's development! Venue: Bhupen Hazarika Auditorium Time: 5.15 pm - 6.00 pm, 27th Dec Any doubt(s): Contact Debate Coordinator(s): d.bipul@iitg.ac.in , p.shankar@iitg.ac.in IIT Guwahati Artificial Intelligence Confluence 27-28th Dec 2024 at the Indian Institute of Technology

Guwahati



To Participate:

- Be at the venue
- Time: 6:00 6:45 pm, 27th Dec
- Venue: Bhupen Hazarika Auditorium, IIT Guwahati

What's in Store?

- Brain-teasing Questions
- A chance to win accolades!
- Fun & Learning Combined Walk away with newfound knowledge and some cool Al trivia.

Artificial
Intelligence
Confluence

Join us for an electrifying quiz that dives into the fascinating world of Artificial Intelligence.

From its technical marvels to its cultural moments, from its roots in history to its impact on India, this quiz is a chance to showcase your AI prowess!

27-28th Dec 2024 at the Indian Institute of Technology Guwahati



Why Participate?

- Showcase your skills in data analytics and machine learning.
- Collaborate with like-minded peers in a team-based environment.
- Gain exposure to real-world datasets and challenges.

Who Can Join?

- Students, professionals, and anyone passionate about data.
- Both individual and team registrations are welcome!

Participation Link:

Register here to participate:

https://www.kaggle.com/t/fb4281b6d46a4f4587f460d0cc2a9738

Important Dates:

- Competition Start Date: 21st Dec. 2024
- Competition End Date: 27th Dec. 2024,
- 03:30 PM IST
- Leaderboard Release Date: 26th Dec. 2024, 07:00 PM IST

Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology Guwahati

For Queries Contact:

- Faculty Coordinator: Dr. Chiranjib Sur (chiranjib@iitg.ac.in)
- PhD Student Volunteers:
 - Jyotishman Bora (j.bora@iitg.ac.in)
 - Nikhil Jaiswal (j.nikhil@iitg.ac.in)
 - Pallapu Mohan Krishna (k.pallapu@iitg.ac.in)
 - Shania H (h.shania@iitg.ac.in)

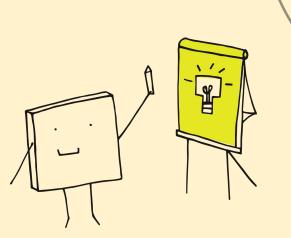
Join us and take the challenge to think critically, work collaboratively, and create solutions that make a difference. Let's redefine possibilities with data!

Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology, Guwahati

Poster Session

Venue: Conference Center Time: 2.30 pm - 3.30 pm, 28th Dec



Cultural Evening

Venue: Conference Center Time: 7 pm - 8 pm, 28th Dec



Panel

Discussion

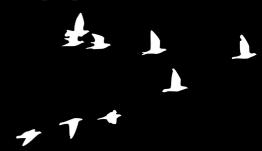
IIT Guwahati Artificial Intelligence Confluence

27-28th Dec 2024 at IIT Guwahati

Venue: Bhupen Hazarika Auditorium

Time: 5 pm - 6 pm, 28th Dec

Building the AI Workforce of Tomorrow: Skills, Systems, and Opportunities



Mehta Family School of 🚡 Data Science & **Artificial Intelligence**

Indian Institute of Technology Guwahati

Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology, Guwahati



Let's Converge to Create **Tomorrow**

- Join Al us at the IITG Al Confluence 2024!

Check our website for updates:

https://event.iitq.ac.in/ai confluence2024/

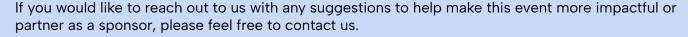
Mehta Family School of Data Science and Artificial Intelligence
Indian Institute of Technology Guwahati

Understanding, Building and Sharing Intelligence since 2021

https://www.iitg.ac.in/dsai/

Artificial Intelligence Confluence

27-28th Dec 2024 at the Indian Institute of Technology Guwahati



Neeraj Sharma, Assistant Professor, IIT Guwahati | Email: neerajs@iitg.ac.in
Teena Sharma, Assistant Professor, IIT Guwahati | Email: teena@iitg.ac.in
Ratnajit Bhattacharjee, Professor, IIT Guwahati | Email: ratnajit@iitg.ac.in





Mehta Family School of Data Science and Artificial Intelligence

Indian Institute of Technology Guwahati, Assam 781039, India Office: 2nd Floor, Computer and Communication Centre (CCC) Email: mfsdsai_off@iitg.ac.in, Phone: +91-361-258-3400 Website: https://www.iitg.ac.in/dsai/