# 1ST ANNUAL
# QEDS CONFERENCE

**5-7 MARCH, 2024**

**5-7 MARCH**
**2024**

**SEMINAR HALL 2**
**R&D BUILDING**

## Data-Driven Analytics in Contemporary Economics & Business

**CENTRE FOR QUANTITATIVE ECONOMICS & DATA SCIENCE**
**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, 835125**

# ABOUT BIT MESRA

Established in 1955 by the visionary industrialist Mr. BM Birla, BIT Mesra was founded with a clear vision to offer its young minds a space, where their imagination could take wings and their ideas fruition. For over 6 decades now, the institute has nurtured minds with a rich heritage of academic excellence, developing learning frameworks that have been well ahead of times. From its inception till date, BIT Mesra continues to boldly tread paths uncharted. As a result, it has successfully conceived and implemented initiatives that have culminated in many firsts.

- First technical institution to establish a Department of Space Engineering & Rocketry way back in 1964.
- First to establish a static rocket test firing facility.
- First to offer P.G. programmes in association with the Indian Space Research Organization (ISRO).
- Initiated the concept of Science & Technology Entrepreneurs Park (BIT-STEP) well before it was adopted as a national model.
- First institution to be granted autonomous status in 1972 under UGC Act.

Our state-of-the-art facilities are at the intersection of learning and hands-on experience, which equip students to dive deep into real-life work situations. From advanced labs with high-end servers to a wide gamut of print and digital learning resources in the library, students have the wherewithal at their disposal to engage in quality learning. Besides this, the campus is equipped with recreational and sports facilities that aid in the holistic development of students, preparing them for the world of tomorrow. BIT's Campus Recruitment Program has been enabling the right talent and opportunity match for over 5 decades now. Companies who have been hiring from our campus have returned for placement sessions every subsequent year reposing their trust in the talent that BIT Mesra churns out, every year. Our student's diverse backgrounds and the balance of technical and soft skills make them well placed for not just exponential growth in their respective careers, but also for contributing to the success of any organization they join. Campus Recruitment Programmes are also organized in our other campuses, namely, Jaipur, Noida, Deoghar & Patna.

# ABOUT THE CENTRE

The Centre for Quantitative Economics and Data Science was established in the year 2021 with the aim to provide fundamental knowledge and problem-solving skills in the area of Quantitative Economics and Data Sciences. This will help in disseminating the acquired knowledge towards improving analytical skills, research and practical application. The Centre is recognized at par with existing leading Centres in terms of available computational facilities and academic & research infrastructure. The Centre remains committed to its two-fold mission.

- To become a globally recognized centre of excellence in teaching and research by producing academicians, professionals, and innovators to create a better world where a profound understanding of the fields of Quantitative Economics and Data Sciences drives positive change in business and society.

- To produce original & robust research insights, deliver high-quality & evidence-based education and engage with people & organisations worldwide, across the private & public sectors, who are motivated to transform the world by tackling real-world challenges.

**BIRLA INSTITUTE OF TECHNOLOGY**
MESRA - 835215, RANCHI (JHARKHAND), INDIA
Prof Indranil Manna
*Vice-Chancellor*
प्रो. इन्द्रनील मन्ना
*कुलपति*

बिरला प्रोधौगिकी संस्थान
मेसरा - 835215, रांची (झारखण्ड), भारत

*दुरभास/Phone* : 0651-2275402
*फैक्स/Fax* : 0651-2275401
*ई-मेल/E-mail* : vc@bitmesra.ac.in

3rd March 2024

## MESSAGE

I am pleased to learn that the Centre for Quantitative Economics and Data Science (CQEDS) at BIT Mesra is organising its 1st Annual QEDS Conference on "Data Driven Analytics in Contemporary Economics and Business" from March 5 to 7, 2024 at BIT Mesra, Ranchi.

I extend a warm welcome to all the guest speakers and participants. This Conference is the first of its kind endeavour of the Centre to bring together young researchers, students, and specialists on one common platform to discuss and disseminate the latest empirical and applied research ideas in various disciplines of Economics, Statistics and Data Science. The theme resonates and synergises well with the core subject domain that the Centre aims to focus on and specialize in. The objective of this Conference should be to provide an insight into the recent advancements of data analytics tools and techniques making a difference in the emerging economic science area and its applications. I appreciate the venture of the young and enthusiastic organising team to create a resource-rich environment during these two and a half days. I further hope that the active participation of the eminent invited speakers from different reputed institutions will greatly benefit and inspire young students and professionals. The Conference should create an ambience that would promote meaningful conversation and scholarly thoughts among the participants that will eventually germinate novel ideas and help advance research and innovation to the benefit of society. A bonus will be if this interaction leads to future research collaborations in multidisciplinary areas of social and decision sciences among the participants. It will be a good idea to repeat this exercise on a regular frequency to emerge as a flagship event that the professionals in this field will look forward to enthusiastically participating in.

The Institute is proud to watch the youngest academic entity of BIT Mesra making bold strides.

I wish the participants and organizers of the Conference QEDS 2024 a grand success!

03.03.2024

**(Indranil Manna)**

BIRLA INSTITUTE OF TECHNOLOGY
MESRA - 835215, RANCHI (JHARKHAND), INDIA

बिरला प्रोधौगिकी संस्थान
मेसरा - 835215, रांची (झारखण्ड), भारत

**3RD MARCH 2024**

# MESSAGE

We are happy to organise the 1 st Annual QEDS Conference 2024 and arrange a worthy list of eminent personalities cutting across fields of Economics, Statistics and Data Science to come and exchange ideas with young researchers and students. Ever since its establishment in the year 2021, the Centre with its growing guild of enthusiastic young faculties, have been organising a range of workshops and seminars where students, both within and outside our Institute, get hands-on-training in data analytical methodologies and recent advances in AI and ML. This Conference is the latest initiative in this regard where students and scholars will get the opportunity to be exposed to discourses from subject experts outside the boundaries of the classroom. The Conference is aimed to create a space to encourage interactions on how state-of- the-art advances in Data Science can be used in economic and business forecasting and strengthening the ability to draw causal inference problems for the upcoming challenges of tomorrow in the respective fields of research and study. I acknowledge the organising team for their efforts to put together this event and urge all the participants to make the most judicious use of the occasion.

Dr. Kunal Mukhopadhyay
Professor and Head
Centre for Quantitative Economics and Data Science
Birla Institute of Technology Mesra

# ABOUT THE CONFERENCE

The 1 st Annual QEDS Conference 2024 themed, "Data driven Analytics in Contemporary Economics and Business" is the first edition of the yearly annual conclave that the Centre for Quantitative Economics and Data Science (CQEDS), Birla Institute of Technology, Mesra proposes to organize. The two and a half-day conference showcases contemporary developments in various sub-disciplines of Economics, Statistics and Data Science. It features special invited talks by six reputed personalities in these above fields. Their esteemed lectures offer a plethora of extremely relevant research concerns that range from critically evaluating the Indian banking system to platform business models; from understanding block likelihood inferences to spatial regression applications and much more. We cordially thank all our guest speakers for responding so generously to our invitation and coming to BIT Mesra to enlighten the participants with their deliberation. We have also received very interesting research papers for presentation at our Conference from PhD scholars and young faculties affiliated to various educational Institutes pan-India. A brief overview of all the guest lectures and topics for the paper presentation are provided in subsequent pages.

The Conference is designed with a socially beneficial perspective. On one hand, the complexity and volatility of the modern economy have emerged as a threat and led to unprecedented challenges in fronts of economic development, environment, well-being, inequality, and so on. On the other hand, the availability of large-scale data, big data and advanced computation technologies have come up as an opportunity to unleash new dimensions of data analytics and inference making. The conference will provide a platform to presenters to demonstrate how innovatively both the threats and opportunities can be harnessed to come up with the discourses and solutions for some of the pressing issues of the modern economy. The attendees of the conference will gain valuable insights on a myriad of contemporary topics related to India and global economy, innovative methodologies for analyzing and interpreting data, problem-solving approach and so on. In a landscape increasingly reliant on informed decision-making, this conference aims to equip academics with the tools and insights needed to navigate complex challenges. By fostering the exchange of knowledge and ideas, such a conference can facilitate the development of more accurate predictive models, evidence-based policy recommendations, and informed business strategies. Overall, the conference will provide an invaluable learning opportunity to young students and professionals as they can gain exposure to the latest trends, cutting-edge technologies, and best practices in data analytics, equipping them with practical skills that are highly sought after in the job market.

I am immensely grateful to my fellow colleagues who are also my team members of the organizing committee for constantly and consistently supporting my ideas and vision about the Conference right from penciling to actually materializing. I sincerely believe that we at the Centre will be able to successfully take up this Conference to be a yearly flagship event that expands its horizons with every passing year.

Dr. Shrimoyee Ganguly
Convenor
Assistant Professor in Economics
Centre for Quantitative Economics and Data Science
Birla Institute of Technology Mesra

# ORGANIZING COMMITTEE

**Dr. Indranil Manna**
PATRON
HON'BLE VICE CHANCELLOR

**Dr. Kunal Mukhopadhyay**
HEAD OF DEPARTMENT

**Dr. Shrimoyee Ganguly**
CONVENOR

**Dr. Mrinal Jana**
CO-CONVENER

**Dr. Tamalika Koley**
SECRETARY

**Dr. Saheli Bose**
PROGRAM CHAIR

**Dr. Manish K. Pandey**
PUBLICATION CHAIR

**Dr. Kusum Lata Mishra**
HOSPITALITY CHAIR

**Dr. Tina Dutta**
FINANCE CHAIR

# CONFERENCE SCHEDULE

| Day 1 - 5th March, 2024 | |
|---|---|
| **Time** | **Event** |
| 09:30 – 10:30am | Inaugural Session |
| 10:30 – 11:00am | High Tea |
| 11:00 – 12:00 noon | Plenary Lecture 1<br>Speaker: Professor Rahul Mukherjee<br>Indian Institute of Management Calcutta<br>Session chair : Dr. Tamalika Koley |
| 12:00 – 01:00pm | Plenary Lecture 2<br>Speaker: Professor Rahul Mukherjee<br>Director, National Institute of Bank Management, Pune<br>(Former Professor IIM Calcutta)<br>Session chair: Dr. Shrimoyee Ganguly |
| 01:00 – 02:30pm | Conference Lunch<br>Venue: IGH |
| 02:30 – 04:30pm | Paper Presentations Session<br>Chair: Dr. Kusum Lata Mishra |
| 04:00 – 04:15pm | Tea Break |
| 7:30pm onwards | Dinner for guests and participants<br>Venue IGH |

| Day 2 - 6th March, 2024 | |
|---|---|
| **Time** | **Event** |
| 10:00 – 11:00am | Invited Lecture 3<br>Speaker: Professor Vimal Kumar,<br>Department of Humanities and<br>Social Sciences,<br>Indian Institute of Technology Kanpur<br>Session chair: Dr. Saheli Bose |
| 11:00 – 11:15am | Tea Break |
| 11:15 – 12:15pm | Invited Lecture 4<br>Speaker: Professor Mousumi Dutta<br>Presidency University, Kolkata<br>Session chair: Dr. Mrinal Jana |
| 12:30 – 02:00pm | Lunch for guests and participants<br>Venue IGH |
| 02:15 – 04:15pm | Paper Presentations<br>Session Chair: Dr. Sayoree Gooptu |
| 04:15 – 04:30pm | Tea break |
| 7:30 pm onwards | Dinner for guests and participants<br>Venue IGH |

# CONFERENCE SCHEDULE

| Day 3 - 7th March, 2024 | |
|---|---|
| **Time** | **Event** |
| 10:30 – 11:30am | Invited Lecture 5<br>Speaker: Professor Anup Dewanji,<br>Applied Statistical Unit,<br>Indian Statistical Institute, Kolkata<br>Session chair: Dr. Tina Dutta |
| 11:30 – 11:45am | Tea Break |
| 11:45 – 12:45pm | Invited Lecture 6<br>Speaker: Professor Animesh Mukherjee,<br>Department of Computer Science & Engineering<br>Indian Institute of Technology, Kharagpur<br>Session chair: Dr. Manish Kr. Pandey |
| 12:50 – 01:15pm | Valedictory Session<br>Vote of Thanks and Distribution of certificates |
| 01:15pm onwards | Concluding Lunch<br>Venue : IGH |

# GUEST LECTURES

# DAY 1

**Dr. Rahul Mukherjee**

**Indian Institute of Management Calcutta**

### Title: Block Likelihood Inference: Higher efficiency via spread out blocks

We consider the effective sample size for and hence the efficiency of block likelihood inference which is an attractive and computationally feasible alternative to full likelihood inference for large correlated datasets. We explore how the choice of blocks impacts this effective sample size. This is done by introducing a column-wise blocking method which spreads out the spatial points within each block, instead of keeping them close together as the existing row-wise blocking method does. It is seen that column-wise blocking can lead to considerable gains in effective sample size and efficiency compared to row-wise blocking while retaining computational simplicity. Analytical results in this direction are obtained under the AR (1) model. The insights so found facilitate the study of other one-dimensional correlation models as well as correlation models on a plane, where closed-form expressions are intractable. Simulations are seen to provide support to our conclusions.

**Dr. Partha Ray**

**Director,**
**National Institute of Bank Management, Pune**

### Title: The Indian Banking System: Good Times, Bad Times & the Turnaround

The lecture will narrate the story of the evolutionary journey of non-performing assets (NPA) in the Indian banking sector. Three distinct phases of the intertemporal behavioural of NPAs of the Indian banking sector are discerned. First, since the initiation of financial sector reforms till about the beginning of the global financial crisis, NPAs showed a consistent downward trajectory. Second, during 2008-09 through 2017-18 the NPAs showed a distinct spurt. Third, since then, NPAs marked by a downward trend till 2019-20 until the economic disruptions caused by Covid 19. Contrary to the popular perception of treating the second phase of rising NPAs as one emanating exclusively from governance issues in public sector banks (PSBs), four factors have been identified: (a) falling commodity prices; (b) regulatory forbearance; (c) initial exuberance in infrastructure projects punctured by a downward phase of business cycles (leading to substantial debt accumulation of select big corporates); and (b) governance failure in select PSBs. Moving forward, while the pandemic and some of the associated policy measures could reverse the recent downward trends in NPA, more durable policy initiatives like bankruptcy reforms had significant positive changes in the NPA situation of Indian banks.

# GUEST LECTURES

# DAY 2

**Dr. Vimal Kumar**
**Professor & Head**
**Economic Sciences,**
**Indian Institute of Technology, Kanpur**

### Title: Platform Business Model as a Hallmark of Digital Economy

Digital platforms such as Amazon, Zomato, Uber, Netflix, and Facebook have become essential to our daily lives. This talk attempts to systematically present the economics of these platforms, emphasizing their role in the modern economy, the challenges they face, and the changes they bring to how we do business, and the driving forces behind their origin. The lecture highlights the unique economic nature of data. Digital platforms rely heavily on and generate tremendous amounts of data. This talk also describes how data differs from typical goods and services and how this unique nature contributes to the emergence of big platform businesses. The potential benefits and drawbacks of big platform businesses will be discussed. These big platforms can, on the one hand, provide tremendous benefits to society; on the other hand, they can use their position to manipulate the market. The talk alludes to a regulatory framework that our government may need to handle these big platforms. The talk also emphasises the research questions that one can explore in this area of the economy.

**Dr. Mousumi Dutta**
**Professor,**
**Economics Department,**
**Presidency University,**
**Kolkata**

### Title: Spatial regression: A brief introduction with applications

Regression methods are an essential part of conventional confirmatory analysis. Incorporating geospatial locations to the data set can, however, offer additional insights. In the lecture, we will briefly cover the basics of spatial regression. An application of spatial regression models to study the regional variations and determinants of child malnutrition will also be discussed.

# GUEST LECTURES

# DAY 3

**Dr. Anup Dewanji**
**Professor,**
**Applied Statistics Unit**
**Indian Statistical Institute,**
**Kolkata**

### Title: Lifetime Data Analysis: An Introduction

Lifetime Data Analysis, or Survival Analysis, is an important area in recent statistical research including Data Science having applications primarily in health sectors. In this talk, the topic of Life time Data Analysis will be introduced. The objectives of this area of research will be discussed and illustrated through examples. Thereafter, the methods will be discussed briefly with some simple examples to motivate the participants.

**Dr. Animesh Mukherjee**
**Professor**
**Department of Computer Science and Engineering , Indian Institute of Technology, Kharagpur**

### Title: Biases in e-commerce platforms

In this talk, I shall briefly outline our three-year-long project on biases in e-commerce platforms. In the first part of the talk, I shall discuss how Amazon over promotes its private label products across its sponsored recommendations (FAccT 2019). We construct related item networks and measure various observables in order to quantify the overpromotion. Next, I would discuss how Amazon affiliate sellers enjoy a disproportionately large number of buybox wins and user ratings. Finally, I would touch upon the biases in the explanations presented by the Amazon VA -- Alexa -- while shopping (The WebConf 2022).

# PAPER PRESENTATIONS

# DAY 1

**Dr. Supriyo Roy**
**Associate Professor**
**Department of Management**
**Birla Institute of Technology, Mesra**

### Title: Optimizing Defect Rework to Reduce the Schedule Variation for A Software Start-Up Quality Perspective

Managing project completion within time is significant to all firms sustainability. For software start-up firms, it is of utmost importance. For any schedule variation, these firms spend 25 to 40 percent of the development on the cost of 'reworking quality defects'. Significantly, the existing literature does not support defect rework opportunities under quality aspects among Indian IT start-ups. The present study aims to fill this niche by proposing a unique mathematical model of the defect rework aligning with the Six Sigma quality approach. The primary objective of this study is to reduce the 'time' of the rework phase at an optimum 'cost'. A unique scientific contribution to the theory of operational excellence in the software domain has been attempted by developing a mathematical model of the defect rework process. An optimization model was formulated, comprising the two objectives: rework of 'time' and rework of 'cost'. The proposed mathematical formulation deduced the perennial issue of high rework 'time' and 'cost' into a multi-objective optimization problem. Software start-ups specifically ask for cost optimization while looking for solutions to their operational issues. A case study was developed in relevance, and for the model solution, we used MATLAB and an elitist, Non-dominated Sorting Genetic Algorithm (NSGA-II). The derived 'Pareto Optimal' front can be used to estimate the 'cost' for a pre-determined rework 'time' and vice-versa. The Six Sigma quality approach integrates the mathematical model with the DMAIOC framework. The conventional stages of DMAIOC analyzed the rework problem to make it quantifiable. By the end of the 'Improve' phase, a Decision-tree model was created to predict the defect counts. The mathematical model with the expected defect count was then applied in the 'Optimize' phase of the DMAIOC to obtain the multi-objective formulation for the case study's problem. The formulated problem was solved with MATLAB's 'gamultiobj' solver. The findings of this study indicate that the 'Cost' to improve per unit time is less when the estimated rework time is close to 250 hours for the present case. These are generally ill-managed projects. Significant improvement can be achieved at a small cost. The price to improve per unit rework time increases as the estimated time reduces. There is a stiff increase in 'Cost' if the time is reduced to a value lesser than 140 Hrs. The output of the proposed solution significantly reduced the rework' time' in the case study by 31 percent.

**Naboshree Bhattacharya**
**Assistant Professor,**
**Amity School of Economics,**
**Amity University, Jharkhand**

### Title: Assessing Patient and Staff Perceptions of Quality in Healthcare Delivery: AComparative Study of PMJAY-empanelled Private and public Hospitals in Ranchi District

The study assesses the perceived quality of healthcare under the Pradhan Mantri Jan Arogya Yojana (PMJAY) in Ranchi District, contrasting patient and healthcare staff perspectives in public vs. private hospitals. It emphasizes the critical role of healthcare quality in economic growth and individual well-being, highlighting the importance of Public-Private Partnerships (PPPs) while addressing their challenges. Through a structured survey, the study explores healthcare quality dimensions—effectiveness, safety, patient-centeredness, timeliness, efficiency, and equity. It employs Principal Component Analysis and Multiple Linear Regression to analyze the data, revealing a notable perception gap in the quality of care between public and private facilities. The findings suggest that patients and staff in private hospitals perceive the quality of care to be higher compared to public hospitals. This research contributes to understanding the complex dynamics of healthcare delivery in India, offering insights into the effectiveness of PMJAY and PPPs in enhancing healthcare quality.

# PAPER PRESENTATIONS

# DAY 1

**Dr. Neelu Kumari**

**Assistant Professor, Department of Economics, Ranchi University**

### Title: Impact Of Pradhan Mantri Mudra Yojana on The Entrepreneurship

The Pradhan Mantri Mudra Yojana, the government of India's flagship programme, was unveiled in 2015 with the dual goals of fostering an entrepreneurial culture in the country and financing the underfunded. Under this program, borrowers who have the capacity to profit from the market and who take pleasure in being entrepreneurs are eligible for loans without the need for collateral. Many women who were unable to take the initiative due to a lack of collateral are now able to pursue professions in business because to this program. The PMMY project gave women the opportunity to start businesses without needing collateral and to obtain funding, which improved their potential and entrepreneurship abilities. To flourish, a business needs to possess a wide range of skills, such as decision-making, business management, and social skills. The effect of the Mudra Yojana on women's entrepreneurship is evaluated in this empirical study. Women who have obtained loans through the PMMY program provided the primary data for this article. This study is based on qualitative data. The data was collected using a five-point Likert scale, and it was analyzed using the Exploratory Factor Analysis (EFA).

**Sk. Karim**

**Ph.D. Scholar**
**Department of Migration & Urban Studies**
**International Institute for Population Sciences (IIPS) Mumbai**

### Title: Visualization of Bilateral Flows and Inter-state out-Migration and Development Disparity in India

Millions of people worldwide move out of their usual place of residence to seek their fortune elsewhere. The number of internal migrants in India was 450 million as per the most recent 2011 census. It showed that over 45.58 crore Indians were found to be 'migrants' for various reasons. Bilateral migration flows effectively represent contemporary migration patterns and facilitate future trends. Objective is to compare the bilateral migration flows between origin and destinations states and analyse the inter-state migration and development disparity in India. We used D-13 Data of 2001 and 2011 migration data and visualized and compared the bilateral internal migration flows from origin to destination and used Primary Census Abstract of the Census of India 2001 and 2011 data for the development disparity analysis. We have used the chord diagram plot to visualize India's recent state-wise migration during from 2001 and 2011. This method showed the complete migration flows between 28 states and 7 UTs in India. Plot has been created with R software's help using the circlize package. It presents information on the origin, destination, and volume of movement and direction of migratory flows between all states. Correlation and regression techniques have been used for measuring the association between development disparity level and interstate out-migrationin India. Bilateral flows visualized that largest migration outflows from the origin state Uttar Pradesh to the destination state Maharashtra in 2001. Considering inflows, Maharashtra and Delhi received 19.2% and 12.9% migrants from other states of India in 2001. Maharashtra and Delhi received 17.4% and 10.4% migrants from other states of India in 2011. The development disparity of the volume of inter-state out-migration in Bihar is always considerably higher than the national average, and it is one of the less developed states of India. On the other hand, Low disparity state was Kerala in terms of all demographic parameters and rapid economic development in India over the past few decades.

# PAPER PRESENTATIONS

# DAY 2

**Pandit Vivek Kumar Pandey**
**Ph.D. Scholar,**
**Department of Electronics and Communication Engineering,**
**Birla Institute of Technology Mesra**

### Title: Parkinson's Disease Detection Using Intrinsic Mode Function Instantaneous Amplitude Deviation Cepstral Coefficient (IMFIADCC) from speech signal

Parkinson's disease is a neurological illness generated by the lack of dopamine hormone secretion from the substensia nigra in the midbrain region and hampers many motor and non- motor activities in the human body. Production of speech is based on laryngeal muscles, so speech production is also affected in Parkinsonism. Voice pathology identifies the variation of speech signals over time and classifies healthy and Parkinson's disease. In this study, an effective feature extraction technique, Intrinsic Mode Function Instantaneous Amplitude Deviation Cepstral Coefficient (IMFIADCC), is proposed to classify healthy and PD subjects. The PC-GITA database has been used in this study. An average accuracy of 85% is achieved in the word /apto/ with the proposed method. The results suggest that the proposed approach is appropriate for PD identification in practical scenarios.

**Vikash Kumar Sharma**
**Ph.D. Scholar**
**Department Mathematics**
**Nilamber Pitamber University, Medininagar**

### Title: A study on certain structures of differentiable manifold

The revolutionary work of Friedrich Bernhard Riemann gave rise to the idea of a manifold, which is now one of the most important ideas in modern differential geometry. It gives us a lot of information about how curved spaces work. This research starts by looking at spaces and their complicated structures before going on to talk about the basic ideas behind differentiable manifolds. One way to think of a differentiable manifold is as a topological space that has local Euclidean features. It is possible to map each point in the manifold onto an open subset of Euclidean space. This makes it easier to use differential calculus methods in these nearby areas. Together, these small Euclidean neighbourhoods, called charts, make up an atlas that helps us understand the world topology and geometry of the manifold. Topological operations are not possible on manifolds because of their natural curves and topology, but because they look a lot like Euclidean space, ideas from differential calculus can be utilized to study their structures more easily. This feature makes it easy and accurate for researchers to look into a wide range of geometric phenomena, such as curvature, connectivity, and differential equations. By looking at complex geometric structures through the lens of differentiable manifolds, a wide range of mathematical and science fields can be understood efficiently. The study of differentiable manifolds helps us understand how geometry, topology, and analysis all work together in many different fields, from general relativity to fluid dynamics and more.

# PAPER PRESENTATIONS

# DAY 2

**Keshav Jhunjhunwala**
**Ph.D. Scholar,**
**Department of Computer Science, St. Xavier's University, Kolkata**

### Title: Deep Learning and Transfer Learning Approaches for Glaucoma Detection: A Comprehensive Review

This study explores the development of deep learning techniques for fundus image analysis in the diagnosis of glaucoma. Highlighting the critical importance of AI in ophthalmic diagnostics, the research focuses on gleaning complex ocular characteristics that are essential for glaucoma identification. Using transformer topologies and convolutional neural networks (CNNs), the study aims to identify minute anatomical differences such as optic nerve cupping and anomalies in the retinal nerve fibre layer. By using deep learning models, fundus pictures may be automatically classified, providing very accurate distinctions between normal and glaucomatous states. The work highlights the opportunity for algorithms based on deep learning to support clinical decision-making by offering quick and accurate evaluations that are essential for prompt glaucoma identification. This is achieved through thorough training, testing, and validation on a variety of datasets. This endeavour not only demonstrates the capabilities of deep learning in optical diagnosis but also highlights how it can revolutionise healthcare accessibility and effectiveness in the field of ophthalmology.

**Kajal Kumari**
**Ph.D. Scholar**
**Centre for Quantitative Economics and Data Science**
**Birla Institute of Technology Mesra**

### Title: Flood Damage Analysis on Various Flood –Prone Districts of Bihar

The Bihar flood is a recurring natural disaster characterized by flood inundation, primarily caused by heavy rains, flat topography, crisscrossed rivers and inadequate system. This paper explores the impact of flood in the Bihar encompassing at aspects such as total damage, total area damage, total human life lost, total cattle lost, crop affected, total house hold damage, and public property damage from 2001-2022.The analysis delves into both year and district wise damage from 2001-2022. It focuses on classifying both the districts and the years into categories depending on the severity of total damage incurred due to flood.

**Manali Gupta**
**Ph.D. Scholar,**
**University Department of Economics, Ranchi University**

### Title: The Importance Of Indian Tourism Industry: Impact On Gross Domestic Product

The research work leading to the thesis entitled "The Importance of Indian Tourism Industry: Impact on Gross Domestic Product" sheds light on the concept and importance of tourism, its current status and trend and also the current status and trend of GDP in India during 1991 to 2019. International Tourist Arrivals (ITA) has been taken as a proxy variable to measure the growth of tourism in an economy. The Trend line has been computed using OLS technique. The four forms of regression equation– exponential, linear, logarithmic and polynomial have been estimated to select the statistically most significant trend of each of the variables. The Best Trend line has been chosen on the basis of the R 2 value and the significance level of 5 %. The study observed the Polynomial Growth Trend in International Tourist Arrivals and Exponential Growth Trends in GDP in India during 1991 to 2019. Inferential analysis hasbeen done to establish the long-run as well as short-run association between the International Tourist arrivals (taken as an explanatory variable) and GDP (taken as dependent variable). The relevant statistical tools used in the comprehensive time series regression analysis were Augmented Dickey Fuller Test for Unit Root (stationarity check), Lag selection criteria for proceeding Johansen's cointegration test, Johansen's cointegration test to establish the long-run association and Error Correction Model (ECM) or Vector Autoregressive (VAR) model. Rigorous classic assumption tests were performed to validate the regression results with the help of Granger Causality Test and Autocorrelation test.