Soudeep Deb

Associate Professor and Chairperson
Decision Sciences Area
Indian Institute of Management Bangalore, India.

Webpage: soudeepd.github.io
Phone: +91 80-26993387
E-mail: soudeep@iimb.ac.in

Current position

Research Interests Time series, Spatio-temporal modeling, Environmental data analysis, Clustering and classification, Nonparametric methods, Sports analytics, Applications of statistics in finance and other disciplines.

Experience

Indian Institute of Management Bangalore, Bengaluru, KA, India. Mar 2020 - Present

- Chairperson, Decision Sciences Area. Apr 2024 - Present
- Associate Professor, Decision Sciences Area. Jul 2024 - Present
- Assistant Professor, Decision Sciences Area. Mar 2020 - Jul 2024

NBC Universal Media, LLC., New York, NY, USA. Sep 2018 - Feb 2020

- Senior Lead Data Scientist, Decision Sciences Division.

Education

University of Chicago, Chicago, IL, USA.

Ph.D., Statistics Aug 2018

- Thesis: Irregular spaced random field, Spatio-temporal data and Clustering of time series
- Advisory committee: Dr. Wei Biao Wu, Dr. Ruey S. Tsay, Dr. Michael L. Stein

Indian Statistical Institute, Kolkata, WB, India.

Master of Statistics (M. Stat.) May 2013

- First Division with Distinction, Specialization: Mathematical Statistics and Probability
- Thesis: Association analysis for identifying rare genetic variants, Advisor: Dr. Saurabh Ghosh

Bachelor of Statistics (B. Stat.) May 2011

- First Division with Distinction

Research grants

India-Israel Joint Research Cooperation (IIJRC) Grant, 10th CFP-2023.

- From Department of Science & Technology, India, and Ministry of Innovation, Science & Technology, Israel.
- Co-PI: Prof. Itai Dattner, University of Haifa, Israel.
- Project: Hybrid-AI Quantile Regression Combining Nonparametric Statistical Methods and Physics-Informed Neural Networks for Analysing Spatio-temporal Climate Data.
- Amount: INR 1.6 million for two years (2024 – 2025).

Research Travel Grant from London Mathematical Society, United Kingdom (UK).

- Offered under Scheme 5 'Collaborations with Developing Countries' Grant
- Co-PI: Prof. Rishideep Roy, University of Essex, UK.
- Amount: GBP 2200 for collaborative research visit to the UK (December 2024)

Research Seed Grant from IIM Bangalore, India.

- Project: Nonparametric methods of structural break detection in time series
- Amount: INR 500,000 for 18 months (July 2024 to December 2025)

Research Seed Grant from IIM Bangalore, India.

- Project: New techniques to analyze categorical and discrete time series data
- Amount: INR 300,000 for two years (August 2021 to December 2023)

Young Faculty Research Chair Grant from IIM Bangalore, India:

- Amount: INR 900,000 for three years (March 2020 to February 2023)

Doctoral students

PhD thesis advisor:

- Anchal Soni, Decision Sciences, Indian Institute of Management Bangalore. Feb 2023
  Thesis: Methods of analyzing structural breaks in multivariate time series: Applications to financial data.
- Siddharth Rawat, Decision Sciences, Indian Institute of Management Bangalore. May 2023
  Thesis: Spatio-temporal models in epidemiology and climate change.
- Kapil Gupta, Decision Sciences, Indian Institute of Management Bangalore. (Exp) 2025
  Thesis: Analyzing house price dynamics using novel spatio-temporal methods.
- Kunal Rai, Decision Sciences, Indian Institute of Management Bangalore. (Exp) 2026
  Thesis: Nonparametric methods and PINN in quantile regression for time series data.

PhD thesis co-advisor:

- Archi Roy, Dept of Mathematics, Indian Institute of Science Education & Research Pune. (Exp) 2025
- Chinmay Divekar, Decision Sciences, Indian Institute of Management Bangalore. (Exp) 2026

Doctoral committee member:

- Sajad S Santhosh, Public Policy, Indian Institute of Management Bangalore. (Exp) 2025
- M Mareeswaran, Finance & Accounting, Indian Institute of Management Bangalore. (Exp) 2025
- Sabhya Rai, Economics, Indian Institute of Management Bangalore. (Exp) 2026

Books

- (With D. Dey) Mathematical Techniques for Competitive Examinations. First edition in 2023, published by Orient Blackswan Pvt Ltd. ISBN: 9393330107.

Journal & conference publications

- **Deb, S.**, Jana, K. (2024) Nonparametric quantile regression for time series with replicated observations and its application to climate data. Statistical Science, 39(3), 428-448. [publication]
- **Deb, S.**, Roy, R., Das, S. (2024). Forecasting elections from partial information using a Bayesian model for a multinomial sequence of data. Journal of Forecasting, 43(6), 1814-1834. [publication].
- Divekar, C., **Deb, S.**, Roy, R. (2024) Real-time forecasting within soccer matches through a Bayesian lens. Journal of the Royal Statistical Society Series A: Statistics in Society, 187(2), 513–540. [publication]
- Chattopadhyay, A., **Deb, S.** (2024) A spatio-temporal model for binary data and its application in analyzing the levels of COVID-19 spread. AStA Advances in Statistical Analysis, 108(4), 823-851. [publication]
- Lakshmi M.V., **Deb, S.**, Sen, R. (2024) Environmentally Responsible Index Tracking: Maintaining Performance while Reducing Carbon Footprint of the Portfolio. Statistics and Applications (forthcoming).
- Gupta, K., Krishnamurthy, V., **Deb, S.** (2024) What elements of the opening set influence the outcome of a tennis match? An in-depth analysis of Wimbledon data. IIMB Management Review. [publication]
- Roy, A., **Deb, S.**, Chakarwarti, D. (2024) Impact of COVID-19 on public social life and mental health: A statistical study of Google Trends data from the USA. J. Appl. Stat., 51(3), 581-605. [publication]
- Roy, A., Soni, A., **Deb, S.** (2023) A wavelet-based methodology to compare the impact of pandemic versus Russia-Ukraine conflict on crude oil sector and its interconnectedness with other energy and non-energy markets. Energy Economics, 124, 106830. [publication]
- **Deb, S.**, Karmakar, S. (2023) A novel spatio-temporal clustering algorithm with applications on COVID-19 data from the United States. Computational Statistics & Data Analysis, 107810. [publication]
- Mareeswaran, M., Sen, S., **Deb, S.** (2023). New methods of structural break detection and an ensemble approach to analyze exchange rate volatility of Indian rupee during COVID-19. Journal of the Royal Statistical Society Series A: Statistics in Society, 187(1), 39-61. [publication]
- **Deb, S.** (2023). Analyzing airlines stock price volatility during COVID-19 pandemic through internet search data. International Journal of Finance & Economics, 28(2), 1497-1513. [publication]
- Rawat, S., **Deb, S.** (2023). A spatio-temporal statistical model to analyze COVID-19 spread in the USA. Journal of Applied Statistics, 50(11-12), 2310-2329. [publication]
- **Deb, S.**, Majumdar, M. (2023). A quadratic trend-based time series method to analyze the early incidence pattern of COVID-19. Biostatistics & Epidemiology, 7(1), e2076529. [publication]
- Majumdar, M., Banerjee, M., Sengupta, J., **Deb, S.**, Jana, C. K., Roy, B. K. (2023) Prevalence and spectrum of diabetic peripheral neuropathy and its correlation with insulin resistance – An experience from eastern India. International Journal of Advanced Research, 11(06), 1085-1094. [publication]

- **Deb, S.**, Deb, S. (2022). An ensemble method for early prediction of dengue outbreak. Journal of the Royal Statistical Society Series A, 185(1), 84-101. [publication]
- **Deb, S.** (2022). A goal based index to analyze the competitive balance of a football league. Journal of Quantitative Analysis in Sports, 18(3), 171-186. [publication]
- Nahata, S., **Deb, S.** (2021) A Machine Learning Approach to Analyze the Effect of Situational and Player-Dependent Features on Converting Freekicks in Soccer. In Conference Proceedings 2021 Asia-Singapore Conference on Sport Science (p. 19). [publication]
- **Deb, S.**, Tsay, R. S. (2019). Spatio-temporal Models with Space-time Interaction and Their Applications to Air Pollution Data. Statistica Sinica, 29, 1181-1207. [publication]
- **Deb, S.**, Dey, D. (2019). Spatial Modeling of Shot Conversion in Soccer to Single out Goalscoring Ability. Journal of Sports Analytics, 5(4), 281-297. [publication]
- **Deb, S.** (2019). VAR Model Based Clustering Method for Multivariate Time Series Data. Journal of Mathematical Sciences, 237(6), 754-765. [publication]
- Prickett, K.C., Guiterrez, C., **Deb, S.** (2019). Family Firearm Ownership and Firearm-related Mortality among Young Children: 1976-2016. Pediatrics, 143(2), e20181171. [publication]
- Chazin, H., **Deb, S.**, Falk, J., Srinivasan, A. (2019). New Statistical Approaches to Intra-individual Isotopic Analysis and Modelling of Birth Seasonality in Studies of Herd Animals. Archaeometry, 61(2), 478-493. [publication] [R package]
- **Deb, S.**, Pourahmadi, M., Wu, W. B. (2017). An Asymptotic Theory for Spectral Analysis of Random Fields. Electronic Journal of Statistics, Vol. 11, No. 2, p. 4297-4322. [publication]
- Zechner, C., **Deb, S**., Koeppl, H. (2013). Marginal Dynamics of Stochastic Biochemical Networks in Random Environments. In Control Conference (ECC), 2013 European, p. 4269-4274, IEEE. [publication]

PREPRINTS & SUBMITTED ARTICLES

- **Deb, S.**, Neves, C., Roy, S. (2024+) Nonparametric quantile regression for spatio-temporal processes. Under review. [preprint]
- Roy, A., Podder, M., **Deb, S.** (2024+) Nonparametric method of structural break detection in stochastic time series regression model. Under review. [preprint]
- Panja, M., Chakraborty, T., Biswas, A., **Deb, S.** (2024+) E-STGCN: Extreme Spatiotemporal Graph Convolutional Networks for Air Quality Forecasting. Under review. [preprint]
- Deshmukh, S., **Deb, S.** (2024+) A survey of statistical and machine learning methods of quantile regression in time series and their suitability in predicting dengue outbreaks. Under first revision. Preprint on request.
- Sen, S., **Deb, S.** (2024+) tSNE-Spec: A new classification method for multivariate time series data. Under review. Preprint available on request.
- **Deb, S.**, Das, S. (2024+). Optimal selection of starting lineup for a football team. Under review. [preprint]
- Gupta, K., **Deb, S.** (2024+) A divide-and-conquer approach for spatio-temporal analysis of large house price data from Greater London. Under review. [preprint]
- Rawat, S., **Deb, S.** (2024+). Impact of rising temperature on rainfall: A spatio-temporal study from Bangladesh. Under review. Preprint available on request.
- Soni, A., **Deb, S.**, Das, D., Zaremba, A. (2023+). Structural Breaks and Value-at-Risk in Multivariate Time Series Data: Implications for Cryptocurrency Investors. Under review. Preprint available on request.
- Rawat, S., Durrant, A., Simpson, A., Nielson, G., Berrett, C, **Deb, S.** (2023+) A Bayesian approach to identify changepoints in spatio-temporal ordered categorical data: An application to COVID-19 data. Currently being prepared for submission. [preprint]
- Paul, M., Roy, R., **Deb, S.** (2022+). Effect of influence in voter models and its application in detecting frauds in an election. Under major revision. [preprint]
- Bag, S., Gupta, K., **Deb, S.** (2022+). A review and recommendations on variable selection methods in regression models for binary data. Under resubmission. [preprint]

Teaching

Course instructor, at Indian Institute of Management Bangalore:

- Advanced Statistics for Business (Core for BBA students) — Winter, 2025
- Advanced Statistical Methods & Computing (Core for PhD students) — Fall, 2024
- Multivariate Statistics (Core for PhD students) — Spring, 2021 - 2024
- Sports Analytics (Elective for MBA students) — Fall, 2023 - 2024
- Decision Sciences I (Core for MBA students) — Fall, 2020 - 2024
- Statistical Inference (Core for PhD students) — Winter, 2020

Executive Education Programme, at Indian Institute of Management Bangalore:

- Predictive Analytics for Business Forecasting (Programme Director) — Jan 2025
- Data Science & Artificial Intelligence (5 sessions) — Sep 2024
- MDP for Food Corporation of India (8 sessions) — Apr 2024
- Business Analytics and Intelligence (3 sessions) — Fall, 2022 & 2023

Course instructor, at University of Chicago:

- Introductory Statistics, Chicago Academic Achievement Program (UG) — Summer, 2015 & 2017
- Statistical Models and Methods I (UG) — Winter, 2015

Consulting services

Smart City Mission, Ministry of Housing & Urban Affairs, India — 2024

- Topic: Improvement in quality of education through smart classrooms.

DBS Bank, Singapore — 2023

- Topic: Value of data joint study.

Real Estate Research Initiative (IIMB-RERI), Bengaluru, India — Since 2023

- Topic: Developing a commercial rental index through spatial modeling.

SportsKPI, Bengaluru, India — 2022-23

- Topic: Valuation of a Kabaddi player and its use in building strategies.

Latest seminars

- Nonparametric Regression of Spatio-temporal Data using Infinite-dimensional Covariates. IISA Conference 2024, Cochin, India. Dec 2024
- Structural breaks in the spatial network of real estate dynamics: A study of UK property transactions. Essex Data Science Seminar Series, University of Essex, Colchester, UK. Dec 2024
- Structural breaks in the spatial network of real estate dynamics: A study of UK property transactions. CMStatistics Conference 2024, London, UK. Dec 2024
- Nonparametric changepoint detection in time series data. COMPSTAT 2024, Giessen, Germany. Sep 2024
- A divide-and-conquer approach for spatio-temporal analysis of large house price data from Greater London. EcoSta Conference 2024, Beijing, China. Jul 2024
- A workshop on 'Data summarisation and Visual Storytelling using Statistics', PES University Research Workshop Series, Bengaluru, India. Jul 2024
- Real-time forecasting in sports. AI Frontiers Series, Commonwealth Bank of Australia (virtual). Jun 2024
- A workshop on Sports Analytics. Conference on Excellence in Research & Education, Indian Institute of Management Indore, India. May 2024
- Introduction to Bayesian methods in Econometrics and Statistics. IIMK Skill-Building Series (virtual), Kozhikode, India. Mar 2024
- Nonparametric estimation of shape-constrained time series regression model, RMS Annual Conference 2023, Guwahati, India. Dec 2023
- Using t-SNE in analyzing multivariate time series data, EcoSta 2023, Tokyo, Japan. Aug 2023
- Nonparametric methods to deal with quantile regression problems in time series and spatio-temporal settings. Symposium, National University of Singapore, Singapore. May 2023
- New methods of structural break detection in multivariate time series and its use in modeling financial data. Symposium, Indian Statistical Institute, Kolkata, India. Mar 2023

- A Bayesian approach to identify changepoints in spatio-temporal ordered categorical data. IISA 2022 Conference, Bengaluru, India. Dec 2022
- A goal based index to analyze the competitive balance of a football league. 8th Western Conference on Football and Finance, Reading, UK. May 2022

Honors

At Indian Institute of Management Bangalore:

- Excellence in Teaching Award 2021-22, 2023-24

At University of Chicago:

- International House Ralph W. Nicholas Fellowship 2017-18
- Graduate Council Travel Fund Award 2017
- Runner-up for Department of Statistics Consulting Award 2016
- Nominated for Best Teaching Assistant in Physical Sciences Division Winter 2014

Earlier awards:

- Kishore Vaigyanik Protsahan Yojana scholarship, Indian Institute of Science 2007 to 2013
- Selected for International Mathematical Olympiad Training Camp, India 2007 & 2008

Professional Services

Administrative roles, at Indian Institute of Management Bangalore:

- Chairperson, Decision Sciences Area. Apr 2024 - present
- Doctoral Program Coordinator, Decision Sciences Area. 2023-24
- Mentor in Pre-doctoral Programme, Decision Sciences Area. 2021 - 2024

Editorial Board member, for the following journal:

- Scientific Reports, Associate Editor in the Climate Change track. 2024 - present

Session chairs, at the following conferences:

- (Upcoming) IISA Conference, Cochin, India. Dec 2024
- EcoSta 2024, Beijing, China Jul 2024
- EcoSta 2023, Tokyo, Japan Aug 2023
- 14th and 15th CMStatistics, London, UK Dec, 2021 & 2022

Reviewer, for many journals including the following:

- Biometrics
- Electronic Journal of Statistics
- IIMB Management Review
- Journal of Multivariate Analysis
- Journal of Sports Analytics
- Journal of the Royal Statistical Society: Series A and Series C
- Sankhya A and Sankhya B
- Scientific Reports
- Statistics and Probability Letters

Skills

Technical strength:

- Proficient: R, MATLAB, LaTeX, Microsoft Office, Google Suite
- Working knowledge: Python, SQL, C, C++

Languages:

- Bilingual: English, Bengali; Intermediate: Hindi; Basic: Portuguese.