Satyaki Basu Sarbadhikary

+91 9007164450 • satyakibasusarbadhikary@gmail.com
github.com/SatyakiBasuSarbadhikary/Projects
satyaki-basu-sarbadhikary-2401a5234

Objective

I am passionate about applying statistical methodologies to address complex real-world problems, with a particular focus on spatial statistics, time series analysis, network theory and machine learning. My goal is to develop robust and innovative statistical models that can offer insights across real estate, urban planning, environmental science and other related fields. Currently, my research focuses on detecting structural breaks in spatial networks and analyzing dynamic changes in data. I am eager to continue this pursuit by contributing to advanced research in these areas.

Research Interests

- Time Series Analysis and Change Point Detection
- Spatial Statistics and Spatio-Temporal Models
- Network Analysis and Graph Theory
- Statistical Computing and Machine Learning

Education

National University of Singapore — **Singapore**
PhD Statistics and Data Science — *2025–*

St.Xavier's College (Autonomous) — **Kolkata**
MSc Data Science — *2022–2024*
7.98 CGPA

St.Xavier's College (Autonomous) — **Kolkata**
BSc Hons. In Statistics — *2019-2022*
7.88 CGPA

Additional Academic Qualification

Indian Statistical Institute, Kolkata — **Kolkata**
Post Graduate Diploma, Applied Statistics — *2023–2024*

Certifications

Spatial Data Science and Applications: Yonsei University, South Korea(via Coursera) — Dec 2024
LINK- `https://shorturl.at/5u34C`
Key Skills: Spatial Analysis, QGIS, Big Data, GIS

Experience

Indian Institute of Management Bangalore — **Bangalore**
Research Associate, Decision Sciences — *JUL 2024 – Present*

- **Project 1:** The research aims to detect structural breaks in nine years of UK house price data, analyzed weekly using Greater London county to show how these changepoints offer better insights about the real estate markets. The methodology involves clustering MSOAs using LISA followed by construction of dynamic networks and weighted adjacency matrices. The Laplacian of these matrices is subsequently calculated to identify changepoints.

- **Project 2:** This study evaluates the impact of government communication during public health emergencies, focusing on India's COVID-19 response through Ministry of Health newsletters. The content was categorized into six themes, with a preferential attachment network estimating public preferences and a VAR model analyzing inter-theme dependencies. Sentiment scores were calculated to track sentiment trends over time. This analysis offers insights into the effectiveness and evolution of government messaging during crises.

Indian Statistical Institute Kolkata — **Kolkata**
Research Intern, SQC & OR — *APR 2024 – JUN 2024*
The research uses a data-driven approach to tackle supply chain challenges. It predicts demand with XGBoost, manages inventory dynamically under uncertainty, and forecasts lead times with linear regression. A one-year simulation assesses efficiency using metrics like inventory turnover, service levels, and order fulfillment rates.

TCG Digital **Kolkata**

Data Science Intern *JUN 2023 – JUL 2023*

Implemented data visualization techniques to effectively communicate insights, identified, analyzed, and interpreted trends in complex datasets using both supervised and unsupervised learning techniques, and extensively utilized programming languages such as Python to facilitate these analyses. Additionally, I focused on optimizing machine learning models to enhance prediction accuracy and overall performance.

Publications

Submitted Papers

Das, P., Basu Sarbadhikary, S. (2024+). Creation of a novel machine learning based approach to achieve operational excellence in supply chain. Accepted by Springer Edited Book Series "Decision Sciences and Data Analytics for Operations and Business Excellence" (Volume 03: 'Decision Sciences for Quality and Productivity Improvement: Towards Operational and Business Excellence')(LINK- `https://shorturl.at/POHYJ`)

Basu Sarbadhikary, S., Ganapathy, D., Deb, S., Roy, R. (2024+). Analyzing government health data to explore COVID-19 management strategies – the story of India's pandemic responsiveness. Under review in 75th Annual International Communication Association Conference under Health Communication Division.
(LINK- `https://soudeepd.github.io/Documents/Newsletter_analysis-3.pdf`) .)

Basu Sarbadhikary, S., Roy, A., Deb, S. (2024+). Structural breaks in the spatial network of real estate dynamics: A study of UK property transactions. Manuscript in preparation. Under Review in Environment and Planning B: Urban Analytics and City Science.

Conference

Advances in High-Dimensional Statistical Learning Conference at Indian Institute of Technology, Bombay in collaboration with North Carolina State University, 2024

Research Projects

Summer, 2024- Present: **Structural breaks in the spatial network of real estate dynamics: A study of UK property transactions**

Mentor: Dr. Soudeep Deb, IIM Bangalore.

Abstract: This study examines temporal changes in Greater London's real estate market using weekly data at the MSOA (Middle Layer Super Output Areas) level through a two-stage methodology. First, Local Indicators of Spatial Association (LISA) are applied to identify significant clusters of high and low property prices and spatial outliers, which are then integrated into a network framework incorporating geographical distance. Second, structural breaks in market dynamics are detected using network Laplacians, capturing both gradual and abrupt shifts over time. These findings are further leveraged to develop a localized house price index and a data-driven zoning approach

Fall, 2024: **Analyzing government health data to explore COVID-19 management strategies – the story of India's pandemic responsiveness**

Mentors: Dr. Deepti Ganapathy, Dr. Soudeep Deb, Dr. Rishideep Roy.

Abstract: In this study, we aimed to investigate the impact of government's communication during public health emergencies and evaluate the effectiveness of government messaging with a focus on the Government of India's response during the COVID-19 pandemic. We utilized a network-based approach, using data from newsletters categorized into themes, available from the Ministry of Health and Family Welfare. Our methodology involves utilizing a preferential attachment model to estimate the probability of public preference across the communication themes, followed by a vector autoregressive (VAR) model on the empirical estimated probability to analyze the inter dependencies among the communication themes. We have also used sentiment analysis by computing sentiment scores corresponding to the contents of the newsletter against each theme along with the use of vector autoregressive model (VAR) to analyze how sentiment scores evolve over time.

Spring, 2024: **An Integrated Data Analytic approach for Achieving Operational Excellence in Supply Chain**

Mentor: Dr. Prasun Das, Indian Statistical Institute, Kolkata.

Abstract: This study employs a data-driven approach in a year-long simulation and case study to enhance supply chain

operational excellence. Machine learning techniques are used for demand forecasting, while inventory is dynamically managed under stochastic demand and lead times by determining safety stocks, reorder points, and predicting lead times through linear regression. The effectiveness of these strategies is assessed through key performance metrics, including inventory turnover, service level, and order fulfillment rate.

Curriculum Projects

Winter, 2023-Spring, 2024: **Gender Classification Using Voice**

Mentor: Dr. Mausumi Bose, Indian Statistical Institute, Kolkata

Abstract: This project involves the classification of gender based on voice traits using various machine learning models, with a focus on feature engineering and model optimization.

Depicting Central Limit Theorem through Monte Carlo Simulation: Used R to demonstrate the Central Limit Theorem through simulation, highlighting how sample means converge to a normal distribution as sample size increases.

Achievements

- **Scholarship**: FR. LAFONT SCHOLARSHIP FOR ACADEMIC PERFORMANCE in BSc and MSc.
- **Trinity College London**: Level 2 Certificate in Graded Examination in Communication Skills.
- **Winners**: Inter Class Cricket Tournament, St. Xavier's Collegiate School, Kolkata.
- **Winners**: Inter Class Bengali Elocution Contest, St.Xavier's Collegiate School, Kolkata

Skills

Programming Languages: R (Proficient), Python (Working Proficiency), SQL (Proficient)
System Software: LaTeX (Proficient), Microsoft Office (Proficient)

Languages

English: Fluent Hindi: Fluent Bengali: Native

Non-Core Academic Activity

Article Publication

- **Annual Department Of Statistics Magazine: Prokarsho,St.Xavier's College, Kolkata**
  Existence And Non-Existence Of Minimum Variance Unbiased Estimator (UMVUE), — October, 2021.

(LINK- `https://shorturl.at/F471i`)

Classes

- **Attended Advanced Statistical Methods And Computing Doctoral coursework, Decision Sciences Area at IIM, Bangalore**. - JUL 2024- AUG 2024