Curriculum Vitae

Satvik Saha

Department of Statistics,
Columbia University, New York.

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Education

September 2024 – present
PhD in Statistics, *Columbia University in the City of New York, New York*
Teaching Assistant for Introduction to Statistics, Bayesian Statistics.

August 2019 – June 2024
BS-MS in Mathematical Sciences, *Indian Institute of Science Education and Research, Kolkata*
CGPA – 9.7/10, ranked 1st in the Department of Mathematics and Statistics.
Teaching Assistant for Mathematics I, Statistics I.

2019
ISC, *Delhi Public School, Megacity, Kolkata*
Class 12 – 93.5%, Indian School Certificate (ISC)

2017
ICSE, *Delhi Public School, Megacity, Kolkata*
Class 10 – 94.2%, Indian Certificate of Secondary Education (ICSE)

Research Interests

Optimal Transport, Nonparametric Statistics, Data Depth Statistics.

Awards and Achievements

2024
Awarded the Director's Gold Medal for securing the highest CGPA in the Department of Mathematics and Statistics.

2023
Awarded the *MITACS Globalink Research Internship* (GRI) scholarship.

2017
Awarded the *Kishore Vaigyanik Protsahan Yojana* (KVPY) scholarship, with rank 649 (SA).

Conferences and Camps

2023
Attended the *Canadian Applied and Industrial Mathematics Society (CAIMS) Annual Meeting* at the University of New Brunswick, Fredericton.

2017
Attended the *National Science (Vijyoshi) Camp* at IISc Bangalore, as a KVPY fellow.

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August 2023 – May 2024
Statistical Depths for Multivariate and Functional Data with Applications *(MS Thesis)*
Supervisor: Dr. Anirvan Chakraborty, IISER Kolkata

Studied the construction of numerous depth functions on finite-dimensional as well as function spaces, along with their properties. Examined applications in exploratory data analysis, testing, classification, clustering, and outlier detection tasks. Briefly focused on the concept of local depth, and used this to propose a new kernel based regression procedure. (thesis, presentation)

May 2023 – July 2023
Combining in-host and inter-host viral infection dynamics
Supervisor: Prof. James Watmough, University of New Brunswick

Studied existing agent-based models for the spread of viral infections in a population, as well as ODE-based models for the dynamics of viral infections within a host. Developed a model which operates on both scales, generated and analysed simulation data. Attended the Annual Meeting of the Canadian Society of Applied and Industrial Mathematics (CAIMS 2023).

August 2022 – April 2023
Multi-Task Learning in Natural Language Processsing
Supervisor: Dr. Kripabandhu Ghosh, IISER Kolkata

Studied techniques for identifying, quantifying, and neutralizing bias in word embeddings, in the context of Natural Language Processing (NLP). Worked on adapting a Multi-Task Learning (MTL) model for this task.

May 2022 – July 2022
The Poincaré Theorem for Fundamental Polygons
Supervisor: Dr. Somnath Basu, IISER Kolkata

Studied topics in algebraic topology. Explored tilings of the hyperbolic plane as covering spaces of genus 2 and above surfaces, and how this allows such manifolds to be realized as surfaces of constant negative curvature.

July 2021
The Stone-Weierstrass Theorem
Supervisor: Dr. Somnath Basu, IISER Kolkata

Studied topics in introductory group theory, analysis, and topology. Presented a generously illustrated proof of the Stone-Weierstrass theorem. (notes, presentation)

April 2020
Age stratified SIQR model for the COVID-19 pandemic
Supervisor: Prof. Ranjit Kumar Upadhyay, IIT Dhanbad

Studied the basic SIQR compartmental model in epidemiology, in the context of the emerging COVID-19 pandemic. Modified this model by subdividing each compartment into age groups, with varying degrees of interaction amongst each other. Applied this model (using numerical simulations in python) to understand trends in infection rates/ mortality in countries with different age structures in their population. (paper)

Publications

2024   Saha, S., Gupta, S., Dutta, S., Chatterjee, S. "Characterising Solutions of Anomalous Cancellation." *Resonance*, **29**, 51–68. `doi:10.1007/s12045-024-1737-2`

2020   Upadhyay, R.K., Chatterjee, S., Saha, S., Azad, R.K. "Age-group-targeted testing for COVID-19 as a new prevention strategy." *Nonlinear Dynamics*, **101**, 1921–1932. `doi:10.1007/s11071-020-05879-x`

Software Skills

Languages   Proficient in C, Python, R, MATLAB
Familiar with C++, Java, Mathematica

Tools   Git, HTML/CSS/JS, LaTeX, Numpy/Scipy, Pytorch, Tensorflow, Typst

Student Interests

Chess   Played for the IISER Kolkata Chess Team in the *Inter IISER Sports Meet* (IISM) 2019, as well as Revival 2021.

Coding   Contributed to writing and maintaining the welearn-bot project, a command line interface for IISER Kolkata's learning platform.

Designed and wrote the website of Identity, the Maths Club of IISER Kolkata, former maintainer.

Wrote the popular typst-theorems/ctheorems package for creating numbered environments in the typesetting language Typst, current maintainer.

Other   Founding member of Identity, the Maths Club of IISER Kolkata; organized and coordinated events and competitions, designed problems, contributed articles and blog posts.

Part of the winning team in the Mathematics Treasure Hunt, 2020, organized by IISER Pune.