Satvik Saha

Curriculum Vitae

E104, ICVS, IISER Kolkata
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sahasatvik.github.io

Education

2019 – Present **BS-MS**, *Indian Institute of Science Education and Research*, Kolkata
Current CGPA – 9.63/10
SGPA for Semester I – 9.69, II – 9.38, III – 9.58, IV – 9.56, V – 9.60, VI – 9.60, VII – 9.80, VIII – 10.00

Major courses: Algebra I-III, Algebraic Topology, Analysis I-V, Complex Analysis, Differential Geometry, Geometry of Curves and Surfaces, Graph Theory and Combinatorics, Linear Algebra I-II, Linear Models, Machine Learning and Network Analysis, Numerical Analysis, Ordinary Differential Equations, Probability I-II, Statistics I-II, Statistical Inference, Topology

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

Data Analysis, Machine Learning, Mathematical Modelling, Computational Statistics.

Awards and Achievements

2018 Awarded the *Kishore Vaigyanik Protsahan Yojana* scholarship, with rank 649 (SA).

2022 Scored 338/340 in the General GRE.

Projects

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. 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.

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

August 2020 Upadhyay, R.K., Chatterjee, S., Saha, S. et al. "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 Python, MATLAB

Familiar with C, C++, Java, R, Mathematica

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

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 my institute's learning platform.

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

Others 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.