Aytijhya Saha

Curriculum Vitae

205, B.T. Road
Kolkata - 700108
West Bengal, India
✉ *aytijhyasaha02@gmail.com*
aytijhya.github.io/website/

Education

2023 - 2025 **Master of Statistics [M.Stat]**, *Indian Statistical Institute*, Kolkata, India.
- Currently in 2nd year with specialization in *Theoretical Statistics*
- Dissertation Advisors: *Prof. Aaditya Ramdas* (CMU) & *Prof. Soumendu Sundar Mukherjee* (ISI)

2020 - 2023 **Bachelor of Statistics [B.Stat] (Honours)**, *Indian Statistical Institute*, Kolkata, India.
- Secured 91.1% in aggregate.
- Secured the **1st position** in the B.Stat program among a batch of 40 peers.

2018 - 2020 **Higher secondary education**, *Manindra Nath High School*, Cooch Behar, WB, India.
- Marks in 12th class Board Examination: 98.4%
- Secured a **rank of 8** in 12th class Board Examination (out of ∼7,00,000 candidates)

2010 - 2018 **Secondary education**, *Sunity Academy*, Cooch Behar, WB, India.
- Marks in 10th class Board Examination: 97.3%
- Secured a **rank of 9** in 10th class Board Examination (out of ∼11,00,000 candidates)

Areas of Interest

My research interests span a broad spectrum within algorithms, theory, and applications of **statistics** and **machine learning**. Here is a list of topics I have recently explored or am currently exploring:

- Nonparametric statistics, robust statistics, game-theoretic statistics, online/sequential learning, high-dimensional statistics, change-point detection and localization, causal inference, multi-armed bandits, neural networks.

Published (or accepted) papers/articles

In Journals

2025 **A. Saha**, A. Ramdas. *Saha and Ramdas' discussion of "Poisson-focus" by Ward, Dilillo, Eckley and Fearnhead.* Accepted for publication in the **Journal of the American Statistical Association (JASA).** *To be available at:* https://doi.org/10.1080/01621459.2024.2402957

2024 **A. Saha**, N. R. Pal. *Group-Feature Selection Using a Neural Network With Group Lasso Regularization and Controlled Redundancy.* Published in **Neurocomputing**, Volume 610, 2024, 128596, ISSN 0925-2312. URL: https://doi.org/10.1016/j.neucom.2024.128596

In Conference Proceedings

2024 **A. Saha**, A. Ramdas. *Testing Exchangeability by Pairwise Betting.* Published at the **International Conference on Artificial Intelligence and Statistics (AISTATS), 2024** .URL: https://proceedings.mlr.press/v238/saha24b.html **ORAL**

2023 J. Ray Choudhury*, **A. Saha***, S. Roy, S. Dutta. *Robust Classification of High-Dimensional Data using Data-Adaptive Energy Distance.* Published at the **European Conference on Machine Learning and Knowledge Discovery in Databases: Research Track. (ECML PKDD), 2023.** URL: https://doi.org/10.1007/978-3-031-43424-2_6

*Equal contributions

Preprints / Working Papers

2025 **A. Saha**, A. Ramdas. *Post-detection inference for sequential changepoint localization.* URL: https://arxiv.org/abs/2502.06096.

2024 **A. Saha**, A. Ramdas. *Robust likelihood ratio tests for composite nulls and alternatives.* Submitted to the **IEEE Transactions on Information Theory.** URL: https://arxiv.org/abs/2408.14015

Academic Accolades

2023 - 2024 Received **prize money for outstanding performance** in all semesters (until now) in the M.Stat program at the Indian Statistical Institute

2023 Received **Mrs. M.R. Iyer Memorial Gold Medal** for securing the **first position** in B.Stat (Hons.) program (2020 - 2023) at the Indian Statistical Institute

2023 Received **Nikhilesh Bhattacharya Memorial Gold Medal** for the **best performance in Statistics** in B.Stat (Hons.) program (2020 - 2023) at the Indian Statistical Institute

2023 Received **Usri Gangopadhyay Memorial Gold Medal** in B.Stat (Hons.) program (2020 - 2023) at the Indian Statistical Institute

2023 Secured **overall highest marks** in every academic year of the B.Stat program (2020 - 2023) at the Indian Statistical Institute

2020 - 2023 Received the **prize money for outstanding performance** in all semesters in the B.Stat program (2020 - 2023) at the Indian Statistical Institute (ISI), Kolkata

2021 & 2022 Received **Mukul Chaudhuri Cash Award** in both 1st year and 2nd year of B.Stat program from the Indian Statistical Institute (ISI), Kolkata

2020 - 2025 Received the **Kishore Vaigyanik Protsahan Yojana (Young Scientist Incentive Plan) fellowship**, funded by the Department of Science and Technology, Government of India

2019 Selected to compete for the **European Girls' Mathematical Olympiad (EGMO)** by Homi Bhabha Centre for Science Education

2019 & 2020 Selected **twice** to participate in the **Asian Pacific Mathematical Olympiad (APMO)** from India

2019 & 2020 Selected **twice** to participate in the **International Mathematical Olympiad Training Camp (IMOTC)** organized by Homi Bhabha Centre for Science Education (HBCSE), TIFR

2019 Qualified **Indian National Mathematical Olympiad (INMO)** (among top ∼75 participants all India) organized by the NBHM, Government of India.

2018 - 2019 Qualified aptitude test and interview rounds in SA stream of **Kishore Vaigyanik Protsahan Yojana (KVPY)** exam with an **All India Rank of 388**

Summer Internships (On-site)

Summer, 2024 Summer internship at the **Department of Statistics and Data Science, Carnegie Mellon University, Pittsburgh**

Supervisor: *Prof. Aaditya Ramdas*, Carnegie Mellon University, Pittsburgh

Brief description of the work: Developed robust likelihood ratio tests for composite nulls and alternatives (building upon Huber's work on robust testing for simple hypotheses) using the concept of "reverse information projection," provided a simple way to control the type-1 error at a prespecified level and showed that the tests are asymptotically optimal. [Link to the paper]

Summer, 2023 — Summer internship at the **Big Data Summer Institute (BDSI), School of Public Health, University of Michigan, Ann Arbor**

Supervisor: *Prof. Rahul Ladhania*, University of Michigan, Ann Arbor

Brief description of the work: Analyzed electronic health records (EHR) data using various machine learning techniques, including tree-based and deep learning methods, with a focus on predicting hypertension using lab measurements, demographic information, comorbidities, etc. and worked on causal problems using AIPW, IPW techniques, as well as determining heterogeneous causal effects with causal forests.

Summer, 2022 — Summer internship at the **Indian Institute of Science (IISc), Bangalore**, as a part of the **Summer Research Fellowship Program (SRFP)** organised by **Indian National Science Academy (INSA)**

Supervisor: *Prof. Manjunath Krishnapur*, Indian Institute of Science (IISc), Bangalore

Brief description of the work: Studied some special topics on probability theory including probability in high dimensional space, Markov Chain Monte Carlo, mixing time of Markov chains, Random walks and electrical networks, Hidden Markov Model.

Other Research Projects

2024 **Post-detection inference for sequential changepoint localization**

Supervisor: *Prof. Aaditya Ramdas*, Carnegie Mellon University, Pittsburgh

Brief description of the work: We address a fundamental but largely unexplored challenge in sequential changepoint analysis: conducting inference following a detected change. We study the problem of localizing the changepoint using only the data observed up to a data-dependent stopping time at which a sequential detection algorithm declares a change.

2024 **Discussion of "Poisson-FOCuS: An Efficient Online Method for Detecting Count Bursts with Application to Gamma Ray Burst Detection"** [Link to the code and article]

Supervisor: *Prof. Aaditya Ramdas*, Carnegie Mellon University, Pittsburgh

Brief description of the work: Demonstrated that a specific variant of the "e-detector" offers a promising alternative to the "Poisson-FOCuS" algorithm for online gamma-ray burst detection.

2023 **Testing Exchangeability by Pairwise Betting.** [Link to the paper]

Supervisor: *Prof. Aaditya Ramdas*, Carnegie Mellon University, Pittsburgh

Brief description of the work: Developed a method for *testing exchangeability* through the game-theoretic framework - *testing by betting*, which applies to general observation spaces and is provably consistent against reasonable alternatives.

2023 **Group-Feature Selection Using a Neural Network With Group Lasso Regularization and Controlled Redundancy.** [Link to the paper]

Supervisor: *Prof. Nikhil R Pal*, ISI Kolkata

Brief description of the work: Developed a novel *group-feature selection method based on a multi-layer perceptron network* that can control the redundancy of the selected groups of features and established the monotonicity and convergence of the proposed algorithm.

2023 **Robust Classification of High-Dimensional Data using Data-Adaptive Energy Distance**. [Link to the paper]

Supervisor: *Prof. Subhajit Dutta*, ISI Kolkata and IIT Kanpur

Brief description of the work: Developed robust, computationally efficient, and tuning-free *classifiers tailored for high-dimensional low sample size data*, using the concepts of angular distance and generalized energy distance.

Other Academic Experiences

Jul, 2024 Participant of a summer school at **Columbia University**

Jul, 2021 Participant of **Mathematical Summer in Paris** (online) organised by *CNRS/ Université Paris-Saclay*

May, 2020 Participant (as a member of the senior batch) of **International Mathematical Olympiad Training Camp (IMOTC)** organized by *Homi Bhabha Centre for Science Education (HBCSE), Mumbai*

Apr - May 2019 Participant of **International Mathematical Olympiad Training Camp (IMOTC)** at *Homi Bhabha Centre for Science Education (HBCSE), Mumbai*

Dec 2018 - Jan 2019 Participant of **Indian National Mathematical Olympiad Training Camp (INMOTC)** at *Indian Statistical Institute, Kolkata*

Talks and Presentations

Feb, 2025 Invited talk at Amazon Research (AWS)

Title: Post-detection inference for sequential changepoint localization [Link to the slides]

Jul, 2024 Presentation at Carnegie Mellon University, Pittsburgh

Title: Huber-Robust Anytime-Valid Sequential Probability Ratio Test [Link to the slides]

Sep, 2023 [Invited talk] **D. Basu Memorial Award Presentation** at the ISI, Kolkata

Title: Navigating the Challenges of High-dimensional Low Sample Size Data: A Two-sample Test and a Novel Classification Approach [Link to the slides]

Jul, 2023 Invited talk at the **Symposium on Big Data, Human Health, and Statistics**, University of Michigan

Title: Machine Learning for Healthcare

Mar, 2023 Presentation as a part of the *Statistics Comprehensive* course at ISI Kolkata

Presented the paper titled "Revisiting k-means: New Algorithms via Bayesian Nonparametrics" [Link to the presentation]

Technical / Programming Skills

- **Programming:** R , Python, C, C++
- **Markup:** LaTeX, HTML, Markdown
- **Web App:** Shiny in R

Additional Information

- **Hobbies:** Painting, Chess, Travelling, Table tennis
- **Extracurricular Activities:**
  - **A core member** of the organizing committee of the Math Club at ISI Kolkata, since 2023.
  - Served as a member of the question paper committee for the Mathematics Talent Reward Programme (MTRP, 2023), a math contest for high school students organized by ISI Kolkata students.
- **Google Scholar:** https://scholar.google.com/citations?user=fKv7P-wAAAAJ&hl=en
- **GitHub:** https://github.com/Aytijhya

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