Soham Jana

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Research interests

Theoretical and methodological aspects of high-dimensional statistics, robust estimation, neural networks, causal inference.

Education

PhD. in Statistics and Data Science May 2022
Yale University, New Haven, CT, USA
Thesis: Learning non-parametric and high-dimensional distributions via information-theoretic methods
Advisor: Prof. Yihong Wu

Master of Statistics (Hons.) (First class with distinction) May 2017
Indian Statistical Institute, Kolkata, West Bengal, India
Specialization: Theoretical Statistics
Dissertation: Characterization of single-integral non-kernel divergences
Advisor: Prof. Ayanendranath Basu

Bachelor of Statistics (Hons.) (First class with Distinction) May 2015
Indian Statistical Institute, Kolkata, West Bengal, India

Work experiences

University of Notre Dame, Notre Dame, IN, USA

Assistant Professor, Department of Applied and Computational Mathematics and Statistics. August 2024 – Current

Princeton University, Princeton, NJ, USA

Postdoc, Department of Operations Research and Financial Engineering
Hosts: Prof. Sanjeev Kulkarni and Prof. Jianqing Fan June 2022 – July 2024

Researcher, The First Republic Bank Research and Lifelong Learning Program June 2022 – May 2023

Lecturer Spring 2023 and Fall 2023

Grants and awards

Professional Development

Kaneb Center Course Design Academy, University of Notre Dame 2024 – 2025
Award Amount: USD 5000

Preprints ("∗": Authors list not in alphabetical order)

1. Chen, X.†, Jana, S.†, Metzler, C.A., Maleki, A. and Jalali, S.*, 2025. **Multilook Coherent Imaging: Theoretical Guarantees and Algorithms**. arXiv preprint arXiv:2505.23594. † Equal contributions.

2. Shange Tang, Soham Jana, Jianqing Fan. **Factor adjusted spectral clustering for mixture models**. arXiv preprint arXiv:2408.12564 (2024). Under major revision at the **Journal of American Statistical Association**.

3. Soham Jana, Jianqing Fan, Sanjeev Kulkarni*. **A general theory for robust clustering via trimmed mean**. arXiv preprint arXiv:2401.05574 (2024). Under major revision at the **IEEE Transactions on Information Theory**.

4. Soham Jana, Kun Yang, and Sanjeev Kulkarni*. **Adversarially robust clustering with optimality guarantees**. arXiv preprint arXiv:2306.09977 (2023). Under major revision at the **IEEE Transactions on Information Theory**.

5. Soham Jana, Yury Polyanskiy, and Yihong Wu. **Optimal empirical Bayes estimation for the Poisson model via minimum-distance methods**. arXiv preprint arXiv:2209.01328 (2022). Under minor revision at **Information and Inference - a journal of IMA**.

Journal publications ("∗": Authors list not in alphabetical order)

1. Soham Jana, Henry Li, Yutaro Yamada, and Ofir Lindenbaum. **Support recovery with Stochastic Gates: theory and application for linear models**. Elsevier Signal Processing (2023), 213, p.109193.

2. Yanjun Han, Soham Jana and Yihong Wu, **Optimal Prediction of Markov Chains With and Without Spectral Gap**, in IEEE Transactions on Information Theory, vol. 69, no. 6, pp. 3920-3959, June 2023, doi: 10.1109/TIT.2023.3239508. (**Extended from the NeurIPS version with analysis of higher-order Markov chains and different loss functions**)

3. Soham Jana and Ayanendranath Basu.* **A characterization of all single-integral, non-kernel divergence estimators**. IEEE Transactions on Information Theory 65.12 (2019): 7976-7984.

Conference publications ("∗": Authors list not in alphabetical order)

1. Soham Jana, Yury Polyanskiy, Anzo Teh, and Yihong Wu. **Empirical Bayes via ERM and Rademacher complexities: the Poisson model**. In Conference on Learning Theory 2023 Jul 15, PMLR 195:5199-5235.

2. Yanjun Han, Soham Jana, and Yihong Wu. **Optimal prediction of Markov chains with and without spectral gap**. NeurIPS 2021.

3. Soham Jana, Yury Polyanskiy, and Yihong Wu. **Extrapolating the profile of a finite population**. In Conference on Learning Theory 2020 Jul 15 (pp. 2011-2033). PMLR.

Conferences and invited talks

Joint Statistical Meetings — August 2025
Nashville, TN, USA

International Indian Statistical Association — June 2025
Lincoln, NEB, USA

International Indian Statistical Association — December 2024
Cochin, Kerala, India

Joint Statistical Meetings — August 2024
Portland, OR, USA

University of Notre Dame Statistics Department Seminar — February 2024
Notre Dame, IN, USA

University of Wisconsin-Madison Statistics Department Seminar — February 2024
Madison, WI, USA

University of Texas at Dallas Statistics Department Seminar — January 2024
Richardson, TX, USA

Indian Statistical Institute ISRU Department Seminar — July 2023
Kolkata, West Bengal, India

Conference on Learning Theory (COLT) — July 2023
Bangalore, Karnataka, India

Neural Information Processing systems (NeurIPS) — December 2021
Virtual

Conference on Learning Theory (COLT) — July 2020
Virtual

Teaching

University of Notre Dame

Introduction to probability (ACMS 30530) — Fall 2024, Fall 2025

Modern Machine Learning Techniques with Application (ACMS 80870) — Spring 2025

Princeton University

Probability and stochastic systems (ORF 309/ENG 309/MAT 380) Spring 2023

Statistical machine learning (ORF 570) Fall 2023

Professional activities

Paper reviewer

Annals of Statistics (2)
IEEE Transactions on Information Theory (7)
IEEE International Symposium on Information Theory (1)
Electronic Journal of Statistics (3)
Stat - an ISI Journal (1)
Algorithmic Learning Theory (3)
Bernoulli (1)

Invited organizational duties at conferences

CFE-CMStatistics Conference December 2025
Session organizer: Recent advances in Causal Inference

Joint Statistical Meetings August 2025
Session chair: New Advances in Optimization Algorithms for Causal Discovery

Joint Statistical Meetings August 2024
Session chair: New Advances in Nonparametric Hypothesis Testing - Part I
Session chair: New Developments in Non-Euclidean Statistics

IEEE Conference on Information Sciences and Systems March 2024
Session chair: Machine learning and statistical inference

Community Service: Teaching at Math Circle, Notre Dame Spring 2025
Promoting STEM education among school children

Yale S&DS M.A. admisssion committee 2021
Reviewer: one of the committee members handling over
150 applications and making admission recommendations

Yale S&DS graduate reading group 2020
Co-organizer Scheduled talks and lead discussion sessions

Yale Women in Data Science (WiDS) workshop 2020
Served as a mentor for Yale undergrad students participating
in the WiDS Datathon Challenge 2020

South Asian Graduate and Professional Association at Yale (SAGA) 2018 – 2021
Treasurer, core committee member and cultural committee head
Objective: organizing socio-cultural events to promote cultural exchanges at Yale

Other awards

INSPIRE Scholarship, Govt. of India	2012-2017
Indian National Mathematical Olympiad (INMO) merit certificate (For being among top 75 in the country)	2012