Rajarshi Bhattacharjee

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Research Interests

1) Randomized Algorithms for linear algebraic tasks 2) Online learning, specifically, online caching and resource allocation problems 3) Differential Privacy and Fairness

Education

University of Massachusetts Amherst 2020–Current
Ph.D. in Computer Science, GPA: 4.0/4.0

- Advisor: Prof. Cameron Musco

Indian Statistical Institute 2015–2017
Master of Technology in Computer Science, Final Aggregate: 85.90 %

Jadavpur University 2009–2013
Bachelor of Engineering in Mechanical Engineering, GPA: 7.86/10.00

Academic Research

University of Massachusetts Amherst Amherst, MA
Graduate Research Assistant Fall 2020–Current

- **Randomized Linear Algebra:** Fast algorithms for spectrum approximation.
- **Online algorithms** for **fair resource allocation**
- **Differential privacy**, Fast tensor vector products with applications to approximating attention (ongoing)
- Area: Randomized Algorithms, Linear Algebra, Online Learning, Fairness, Privacy, Caching.

Indian Institute of Technology (IIT) Madras Chennai, India
Project Associate under Prof. Abhishek Sinha July 2019–August 2020

- **Online Caching**
- Online algorithms for minimizing the *age-of-information (AoI)* for users in a communication network.
- Area: Online Learning, Machine Learning, Age-of-information

Indian Institute of Information Technology (IIIT) Hyderabad Hyderabad, India
Research Assistant under Prof. Naresh Manwani February 2018–May 2019

- Worked on **Online learning** algorithms for the weakly supervised setting of *learning with partial labels.*
- Area: Machine learning, Online Learning

Selected Publications and Preprints

(*): alphabetical ordering

1. **Near-Optimal Spectral Density Estimation via Explicit and Implicit Deflation.** (*) Rajarshi Bhattacharjee, Rajesh Jayaram, Cameron Musco, Christopher Musco and Archan Ray. ***ACM-SIAM Symposium on Discrete Algorithms (SODA) 2025.***

2. **Universal Matrix Sparsifiers and Fast Deterministic Algorithms for Linear Algebra.** (*) Rajarshi Bhattacharjee, Gregory Dexter, Cameron Musco, Archan Ray, Sushant Sachdeva and David P. Woodruff. ***Innovations in Theoretical Computer Science (ITCS) 2024.*** [arxiv]

3. **No-regret Algorithms for Fair Resource Allocation.** Abhishek Sinha, Ativ Joshi, Rajarshi Bhattacharjee, Cameron Musco and Mohammad Hajiesmaili. ***Conference on Neural Information Processing Systems (NeurIPS) 2023.*** [arxiv]

4. **Sublinear Time Eigenvalue Approximation via Random Sampling.** (*) Rajarshi Bhattacharjee, Gregory Dexter, Petros Drineas, Cameron Musco and Archan Ray. ***International Colloquium on Automata, Languages, and Programming (ICALP) 2023.*** *Full version in* ***Algorithmica 2024*** [arxiv]

5. **Fundamental Limits on the Regret of Online Network-Caching.** Rajarshi Bhattacharjee, Subhankar Banerjee and Abhishek Sinha. ***Proceedings of the ACM on the Measurement and Analysis of Computing Systems****, Vol 4, No. 2, Article 25, 2020. Also published at* ***ACM SIGMETRICS 2020*** [PDF]

6. **Optimizing the Age-of-Information for Mobile Users in Adversarial and Stochastic Environments.** Abhishek Sinha and Rajarshi Bhattacharjee. ***IEEE Transactions on Information Theory*** [arxiv]

7. **Fundamental limits of age-of-information in stationary and non-stationary environments.** Subhankar Banerjee, Rajarshi Bhattacharjee and Abhishek Sinha. *In 2020 IEEE International Symposium on Information Theory* ***(ISIT), 2020****.* [arxiv]

8. **Online Algorithms for Multiclass Classification Using Partial Labels.** Rajarshi Bhattacharjee and Naresh Manwani. *Proceedings of the Pacific-Asia Conference on Knowledge Discovery and Data Mining* ***(PAKDD), 2020****.* [arxiv]

Industry Experience

Adobe Research — San Jose, US
Research scientist intern — May 2023–December 2023

- Worked on fast and memory efficient computation of the attention layer using techniques from randomized linear algebra to improve training and inference time of transformers.

Deloitte Consulting India Private Limited — Hyderabad, India
Business Analyst/Data Scientist — August 2017–December 2017

- Worked on delivering machine learning based solutions to different clients.

PricewaterhouseCoopers Private Limited — Kolkata, India
Consultant — September 2013–July 2015

- Advised government organizations on improving their efficiency, operations, and overall performance.

Scholarships and Awards

- Awarded **Sudha and Rajesh Jha Scholarship** at UMass Amherst. (awarded to one student every year)
- **Rashi Ray Memorial Medal** for standing **First** in the order of merit in M.Tech. Computer Science program at Indian Statistical Institute
- Awarded **Dean's Fellowship** for the **PhD program** in Systems Engineering at **Boston University**. (declined)

Service

- **Reviewer**: Served as a reviewer for **ICML 2023, NeurIPS 2023 and 2024, ICLR 2024**. External reviewer for **SODA 2023 and 2024, STOC 2022, STOC 2023, WiOpt 2020**.
- **UMass**: Served as a **peer mentor** to incoming Ph.D. students. Served in the UMass PhD **Application Support program** supporting underrepresented candidates for CS PhD applications.

Programming Languages

Python, Matlab