Rajarshi Bhattacharjee

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Research Interests

1) Randomized Algorithms for problems in Linear Algebra, Graph Theory and Machine Learning 2) Online Learning and Optimization 3) Algorithms with Machine Learned Advice

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 % (First Class with Distinction)

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

Research Experience

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

- **Fast Linear Algebra:** Worked on *eigenvalue estimation* of symmetric bounded-entry matrices in *sublinear time* by sampling random submatrices. Also working on *deterministic algorithms* for spectral approximation.
- **Graph Algorithms:** Estimating the maximum *matching* of graphs with bounded arboricity in a streaming model using *sublinear space*
- **Online caching algorithms with machine learned advice**: Exploring tradeoffs between *robustness and consistency* for online algorithms while incorporating machine learned advice.
- Area: Randomized Algorithms, Linear Algebra, Online Learning, Graph theory, Machine Learning, Caching.

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

- **Online Learning:** Designed Online algorithms *for caching* with sub-linear regret and also derived matching lower bounds for the same.
- Worked on **Competitive online algorithms** for minimizing the *age-of-information (AoI)* for users in a communication network. Proved upper and lower bounds on the competitive ratio.
- 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. **Sublinear Time Deterministic Algorithms for Spectral Approximation.** (*) Rajarshi Bhattacharjee, Gregory Dexter, Cameron Musco, Archan Ray and David Woodruff. *Under submission.*

2. **Sublinear Time Eigenvalue Approximation via Random Sampling.** (*) Rajarshi Bhattacharjee, Gregory Dexter, Petros Drineas, Cameron Musco and Archan Ray. *Under submission. Preprint at* [arxiv]

3. **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]

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

5. **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]

6. **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

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

- Worked on development of software modules for different clients using Java, SQL.

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 at Indian Statistical Institute
- Awarded **Dean's Fellowship** along with admission to the **PhD program** in Electrical and Systems Engineering at **Boston University**. (declined offer)

Service

- **Sub-reviewer**: **SODA 2023, STOC 2022, STOC 2023, WiOpt 2020**. Also helped review papers for **IEEE Transactions on Networking, IJCAI 2019**.
- **Mentorship**: Served as a **peer mentor** to incoming Ph.D. students
- Participating in the UMass PhD **Application Support program** supporting *underrepresented candidates for CS PhD* applications.

Relevant Coursework

Advanced Algorithms, Optimization, Machine Learning, Randomized Algorithms, Algorithms with Predictions, Quantum Information Systems, Probabilistic Graphical Models

Programming Languages

Python, Matlab, Java