# Agniva Chowdhury

Computer Science and Mathematics Division
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**Research Interests**

Randomized Algorithms, Numerical Linear Algebra, Mathematical Optimization, Machine Learning, Deep Learning, Dimensionality Reduction, High-Dimensional Statistics, Scientific Computing.

**Education**

**Purdue University** — West Lafayette, IN, USA
**Ph.D.** in *Statistics* — 2015 - 2021

**Indian Institute of Technology Kanpur** — Kanpur, UP, India
**M.Sc.** in *Statistics* — 2009 - 2011

**University of Calcutta** — Kolkata, WB, India
**B.Sc.** in *Statistics* — 2006 - 2009

**Experience**

**Oak Ridge National Laboratory** — Oak Ridge, TN, USA
*Postdoctoral Research Associate* — Jan 2022 - Present

**Purdue University** — West Lafayette, IN, USA
*Research Assistant* — Jan 2017 - Dec 2021
*Teaching Assistant* — Aug 2015 - Dec 2016

**HSBC** — Kolkata, WB, India
*Analyst - Decision Sciences* — Nov 2012 - Mar 2015

**EXL Service** — Gurgaon, Haryana, India
*Senior Programmer Analyst* — Jul 2011 - Nov 2012

**Publications/ Preprints**

1. **A. Chowdhury**, P. Ramuhalli. *A Provably Accurate Randomized Sampling Algorithm for Logistic Regression*. In Proceedings of the 38th AAAI Conference on Artificial Intelligence, 2024 (accepted).
2. A. Bose, M. Burch, **A. Chowdhury**, P. Paschou, and P. Drineas, *Structure-informed clustering for population stratification in association studies*, BMC Bioinformatics 24, p. 411 , 2023.
3. F. Liu, **A. Chowdhury**. *Deep Learning with Physics Priors as Generalized Regularizers*. NeurIPS AI for Science Workshop. 2023.
4. **A. Chowdhury**, G. Dexter, P. London, H. Avron, and P. Drineas. *Faster Randomized Interior Point Methods for Tall/Wide Linear Programs*. Journal of Machine Learning Research (JMLR), 23(336), pp.1-48, 2022.
5. G. Dexter, **A. Chowdhury**, H. Avron, and P. Drineas. *On the Convergence of Inexact Predictor-Corrector Methods for Linear Programming*. In Proceedings of the 39th International Conference on Machine Learning (ICML), 2022. **Selected for long presentation**.
6. **A. Chowdhury**, A. Bose, S. Zhou, D. P. Woodruff, and P. Drineas. *A Fast, Provably Accurate Approximation Algorithm for Sparse Principal Component Analysis Reveals Human Genetic Variation Across the World*. In Proceedings of the 26th Annual Conference on Research in Computational Molecular Biology (RECOMB), 2022.

7. S. Fadnavis, **A. Chowdhury**, J. Batson, P. Drineas, and E. Garyfallidis. *Patch2Self denoising of Diffusion MRI with Self-Supervision and Matrix Sketching*. In bioRxiv. Submitted, 2022.
8. **A. Chowdhury**, P. London, H. Avron, and P. Drineas. *Faster Randomized Infeasible Interior Point Methods for Tall/Wide Linear Programs*. In Advances in Neural Information Processing Systems (NeurIPS), 2020.
9. **A. Chowdhury**, P. Drineas, D. P. Woodruff, and S. Zhou. *Approximation Algorithms for Sparse Principal Component Analysis*. arXiv:2006.12748, 2020.
10. A. Bose, M. C. Burch, **A. Chowdhury**, P. Paschou, and P. Drineas. *CluStrat: A Structure Informed Clustering Strategy for Population Stratification*. In Proceedings of the 24th Annual Conference on Research in Computational Molecular Biology (RECOMB), 2020.
11. **A. Chowdhury**, J. Yang, and P. Drineas. *Randomized Iterative Algorithms for Fisher Discriminant Analysis*. In Proceedings of the 35th Conference on Uncertainty in Artificial Intelligence (UAI), 2019. **Selected for oral presentation.**
12. **A. Chowdhury**, J. Yang, and P. Drineas. *Structural Conditions for Projection-Cost Preservation via Randomized Matrix Multiplication*. Linear Algebra and its Applications, vol 573, pp. 144-165, 2019.
13. **A. Chowdhury**, J. Yang, and P. Drineas. *An Iterative, Sketching-based Framework for Ridge Regression*. In Proceedings of the 35th International Conference on Machine Learning (ICML), 2018.

**Oral Presentations**

1. *Randomized Linear Algebra for Interior Point Methods.* SIAM Conference on Optimization (OP23). Seattle, WA, USA, May 2023.
2. *Randomized Numerical Linear Algebra and its Applications.* Flash talk in ORNL's AI Initiative mid-year review. Oak Ridge National Laboratory, TN, USA, Mar 2023.
3. *On the Convergence of Inexact Predictor-Corrector Methods for Linear Programming*. Bi-weekly meeting of Data-Driven Decision Control for Complex Systems Project (DnC2S). Oak Ridge National Laboratory, Oak Ridge, TN, USA, Aug 2022 (virtual)
4. *Faster Matrix Algorithms via Randomized Sketching & Preconditioning*. Bi-weekly meeting of Data-Driven Decision Control for Complex Systems Project (DnC2S). Oak Ridge National Laboratory, Oak Ridge, TN, USA, Mar 2022 (virtual)
5. *Speeding-up Linear Programming using Randomized Linear Algebra*. Computer Science and Mathematics Division, Oak Ridge National Laboratory, Oak Ridge, TN, USA, Jun 2021 (virtual).
6. *Speeding-up Linear Programming using Randomized Linear Algebra*. Michael Mahoney's Research Group, UC Berkeley, Berkeley, CA, USA, Oct 2020 (virtual).
7. *Randomized Iterative Algorithms for Fisher Discriminant Analysis*. , Graduate Students Seminar, Department of Statistics, Purdue University, West Lafayette, IN, USA, Apr 2020 (virtual).
8. *Randomized Iterative Algorithms for Fisher Discriminant Analysis*. 35th Conference on Uncertainty in Artificial Intelligence (UAI), Tel Aviv, Israel, Jul 2019.
9. *An Iterative, Sketching-based Framework for Ridge Regression*. 35th International Conference on Machine Learning (ICML), Stockholm, Sweden, Jul 2018.

**Poster Presentations**

1. *Randomized Linear Algebra for Interior Point Methods*
   - AI Expo 2023, Oak Ridge National Laboratory. Oak Ridge, TN, USA.
2. *Faster Randomized Infeasible Interior Point Methods for Tall/Wide Linear Programs*
   - 34th Conference on Neural Information Processing Systems (NeurIPS 2020), virtual.
3. *An Iterative, Sketching-based Framework for Ridge Regression*
   - TRIPODS Madison Summer School 2018, Madison, USA.
   - 35th International Conference on Machine Learning (ICML 2018), Stockholm, Sweden.
   - 9th International Purdue Symposium on Statistics, 2018 West Lafayette, USA.
   - Conference on Scientific Computing and Approximation 2018 (in honor of Walter Gautschi), West Lafayette, USA.

**Teaching Experience**

*Lab Instructor*

- STAT 350: Introduction to Statistics (Fall 2016)
- STAT 301: Elementary Statistical Methods (Fall 2015)

*TA and Grader*

- CS 590RA: Randomized Algorithms (Fall 2019)
- STAT 519: Introduction to Probability (Spring 2016, Fall 2016)
- STAT 512: Applied Regression Analysis (Fall 2015, Spring 2016)
- STAT 501: Experimental Statistics I (Summer 2016)

**Honors and Awards**

- Travel Award: NeurIPS 2020 (as complimentary registration)
- Invited to the workshop on "Randomized Numerical Linear Algebra, Statistics, and Optimization" organized by *Center for Discrete Mathematics and Theoretical Computer Science (DIMACS)* at Rutgers University, New Jersey.
- Travel Award: UAI 2019, Tel Aviv, Israel.
- Invited to the workshop on "Randomized Numerical Linear Algebra and Applications" organized by *Simons Institute for the Theory of Computing* at the *University of California, Berkeley*.
- Travel Award: ICML 2018, Stockholm, Sweden.
- Invited to the TRIPODS Madison summer school 2018 on "Fundamentals of Data Analysis" organized by *Institute for Foundations of Data Science (IFDS)* at the *University of Wisconsin–Madison*.

**Technical Skills**

Python, Pytorch, R, MATLAB, SAS, C++, SQL, LaTeX, Excel VBA

**Professional Service**

*Membership:*

- Society for Industrial and Applied Mathematics (SIAM)

*Journal reviewing*

- ACM Journal of Experimental Algorithmics (JEA)
- Journal of Machine Learning Research (JMLR)
- ACM Transactions on Algorithms (TALG)
- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- Journal of Computational and Graphical Statistics (JCGS)
- SIAM Journal on Scientific Computing (SISC)
- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- SIAM Journal on Matrix Analysis and Applications (SIMAX)
- Information and Inference: A Journal of the IMA (IMAIAI)
- Linear Algebra and its Applications (LAA)
- Applied and Computational Harmonic Analysis (ACHA)

*Conference reviewing*

- International Conference on Artificial Intelligence and Statistics (AISTATS), 2022
- International Conference on Machine Learning (ICML) 2020, 2021
- Neural Information Processing System (NeurIPS) 2020

*Committee service*

- Graduate student member of the Diversity and Inclusion Committee 2019-21, Department of Statistics, Purdue University

**Graduate Coursework**

Big Data Theory and Methods, Randomized Algorithms for Big Data Matrices, Computational Statistics, Probability and Stochastic Processes, Linear Models, Regression Techniques, Statistical Inference, Bayesian Statistics, Statistical Methods for D & R Algorithm.

**References**

**Petros Drineas**
Professor and Associate Head
Department of Computer Science
Purdue University
West Lafayette, IN, USA
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**Haim Avron**
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School of Mathematical Sciences
Tel Aviv University
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