Sherry Sarkar

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https://sherrysarkar.github.io/

Mathematics Department
Carnegie Mellon University

Research Interests

Combinatorial optimization problems in "beyond worst case" paradigms (with predictions, stochastic settings, etc.).

Education

2020 – pres **Ph.D., Carnegie Mellon University** Mathematics
completing the Algorithms, Combinatorics, and Optimization (ACO) program

2016 – 2020 **B.S., Georgia Tech** Computer Science
with threads Theory and Intelligence, minor in Mathematics

Research Publications

Journal and Conference Publications

1. Braun, A., & **Sarkar**, **S.** (2024). The secretary problem with predicted additive gap. *Conference on Neural Information Processing Systems (NeurIPS)*. Retrieved from https://arxiv.org/abs/2409.20460
2. Buchbinder, N., Gupta, A., Hathcock, D., Karlin, A., & **Sarkar**, **S.** (2024). Maintaining matroid intersections online. *ACM-SIAM Symposium on Discrete Algorithms (SODA)*. Retrieved from https://arxiv.org/abs/2309.10214
3. Hathcock, D., Jin, B., KalenPatton, **Sarkar**, **S.**, & Zlatin, M. (2024). The online submodular assignment problem. *Foundations of Computer Science (FOCS)*. Retrieved from https://sherrysarkar.github.io/files/online-sap.pdf
4. Gupta, A., Lee, E., Li, J., Mucha, M., Newman, H., & **Sarkar**, **S.** (2022). Matroid-based tsp rounding for half-integral solutions. *Integer Programming and Combinatorial Optimization (IPCO)*. Retrieved from https://arxiv.org/abs/2111.09290
5. **Sarkar**, **S.**, & Soberón, P. (2022). Tolerance for colorful tverberg partitions. *European Journal of Combinatorics*, *103*, 103527. doi:https://doi.org/10.1016/j.ejc.2022.103527
6. **Sarkar**, **S.**, Xue, A., & Soberón, P. (2021). Quantitative combinatorial geometry for concave functions. *Journal of Combinatorial Theory, Series A*, *182*, 105465. doi:10.1016/j.jcta.2021.105465
7. Rubinstein-Salzedo, S., & **Sarkar**, **S.** (2020). Stability for take-away games. *Journal of Integer Sequences*, *23*. Retrieved from https://cs.uwaterloo.ca/journals/JIS/VOL23/Rubinstein/rub3.html

Surveys

1. Kothari, P., & **Sarkar**, **S.** (2022). Sum-of-squares to approximate knapsack: An exposition of the Karlin-Mathieu-Nguyen analysis of sum-of-squares relaxation of Knapsack. Retrieved from https://sherrysarkar.github.io/files/KnapsackSoS.pdf

Employment History

Internships

Summer 2024 — **Research Intern.** Microsoft Research (Algorithms Team)
I worked with the Algorithms team on two flavors of combinatorial optimization problems – submodular maximization and Steiner forest. For the former project, we were interested maximizing a submodular function while enforcing fairness constraints. In the latter project, we studied online Steiner forest in a new beyond-worst case setting, based on stochastic assumptions about the arrivals.

Summer 2020 — **Data Scientist.** Systems Technology Research
I designed unsupervised clustering algorithms on a geo-spatial dataset. I tackled this problem with a spectral based graph cutting perspective. This work culminated in a package for use in an STR project.

Summer 2019 — **Researcher.** CUNY Discrete Geometry REU
I studied the intersection properties of convex sets and produced two papers. One paper was about volumetric extensions of Helly's theorem. Another paper was about probabilistic techniques to prove colorful and robust variants of Tverberg's theorem.

Mentoring

Summer 2023 — **Lead Mentor.** Polymath Jr Research Program
I led a group undergraduate students in an expository research project focused on creating surveys in theory CS.

Summer 2022 — **Graduate Mentor.** Polymath Jr Research Program
I helped mentor undergraduate students in a research project focused on improving upper and lower bounds for small Ramsey numbers. Our work culminated in a computational approach for proving bounds.

Teaching

Spring 2023 — **Teaching Assistant.** CMU: Operations Research

Fall 2022 — **Teaching Assistant.** Euler Circle: Complexity Theory, Abstract Algebra

Summer 2022 — **Teaching Assistant.** New Horizons in Theoretical Computer Science Summer School

Spring 2021 — **Teaching Assistant.** CMU: Concepts of Mathematics

Summer 2020 — **Teaching Assistant.** Euler Circle: Abstract Algebra

Spring 2020 — **Teaching Assistant.** Georgia Tech: Honors Discrete Mathematics

Fall 2019 — **Teaching Assistant.** Georgia Tech: Design and Analysis of Algorithms

Miscellaneous Experience

Skills

Coding — Python, JAVA

Fellowship Awards

2020 — **CMU Mathematics Departmental Scholarship**

2019 — **Goldwater Scholar**, CISE.

NSF Graduate Research Fellowship Program, Honorable Mention

Miscellaneous Experience (continued)

Competition Awards

2022 **CMU ACM Hackathon: Algorithms with a Purpose**, Second Place

2020 **Joint Mathematics Meeting, Outstanding Poster**

2018 **Hack GT: Goldman Sachs Data Mining Challenge**, First Place

2017 **Hack GT: FINRA Data Mining Challenge**, First Place

Leadership and Service

2022 **Graduate Program Committee**. A member of a committee dedicated towards creating an engaging and supportive environment for the math department's PhD students.

2023 – 2024 **Graduate Student and Postdoc Seminar**. Organizer for weekly math department seminar among PhD students and post-docs.

2018 – 2020 **Theory Club**. President of Georgia Tech's undergraduate theoretical CS club.