Joe Suk

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Employment

Columbia University Statistics Dept **Jan. 2025 – June 2025**
Postdoctoral Research Scientist under Prof. Samory Kpotufe working on efficient online outlier detection

Education

Columbia University **2018–Oct. 2024**
PhD in Statistics

Stony Brook University **2014–2018**
B.S. in Mathematics

Research Interests

My PhD research focused on the statistical theory of machine learning, with an emphasis on studying sequential-decision making problems (e.g., multi-armed bandits, reinforcement learning) under changing environments. Prior to this, during undergrad, I did research in combinatorics and geometric topology.

Preprints and Publications

1. Tracking Significant Shifts in Infinite-Armed Bandits.
   Joe Suk, Jung-hun Kim. *Preprint/submitted*.
2. Adaptive Smooth Nonstationary Bandits.
   Joe Suk. *Major revision at SIAM Journal on Mathematics of Data Science (SIMODS)*.
3. Nonstationary Dueling Bandits with a Weighted Borda Criterion
   Joe Suk, Arpit Agarwal. *Transactions on Machine Learning Research (TMLR)* ("Featured Certification").
4. When Can We Track Significant Preference Shifts in Dueling Bandits?
   Joe Suk, Arpit Agarwal. *Advances in Neural Information Processing Systems (NeurIPS) 2023*.
5. Tracking Most Significant Switches in Nonparametric Contextual Bandits
   Joe Suk, Samory Kpotufe . *Advances in Neural Information Processing Systems (NeurIPS) 2023*.
6. Tracking Most Significant Arm Switches in Bandits
   Joe Suk, Samory Kpotufe. *Conference on Learning Theory (COLT) 2022*.
7. Self-Tuning Bandits over Unknown Covariate-Shifts
   Joe Suk, Samory Kpotufe. *International Conference on Algorithmic Learning Theory (ALT) 2021*.
8. Dihedral Sieving Phenomena
   Sujit Rao*, Joe Suk*. *Discrete Mathematics*.
9. Factorizations of k-Nonnegative Matrices.
   Sunita Chepuri*, Neeraja Kulkarni*, Joe Suk*, Ewin Tang*. *Journal of Combinatorics*.

Earlier Research Experience

Data Science Intern at Institute for Pure and Applied Mathematics (IPAM) *Summer 2018*
- Developed data science pipeline in MATLAB and Python to model microstructure evolution in 3D printing for HRL Laboratories.

Undergraduate Mathematics Honors Thesis *2017–2018*
- Developed algorithm to approximate planar trees using harmonic measure and dessins d'enfant.

University of Minnesota Twin Cities Combinatorics NSF REU *Summer 2017*
- Worked on two published research projects in combinatorics and representation theory.

Stony Brook University Geometry/Topology NSF REU *Summer 2016*
- Developed algorithm to count the mapping class group orbits of geodesics on the hyperbolic punctured torus.

Talks and Presentations

- Seoul National University School of Data Science Group – Seoul, Korea (December 2024).
- SUNY Korea Applied Math & Statistics Seminar – virtual (February 2024).
- Columbia Statistics Dept Student Seminar – New York, NY (November 2023).
- Columbia Statistical Machine Learning Symposium – New York, NY (April 2023).
- Conference on Learning Theory – London, UK (July 2022).
- Columbia University Data Science Day Poster Session – New York, NY (April 2022).
- Minghui Yu Memorial Conference at Columbia Statistics Dept – virtual (April 2021).
- International Conference on Algorithmic Learning Theory – virtual (March 2021).
- Joint Mathematics Meetings – San Diego, CA (2018).
- Young Mathematicians Conference – The Ohio State University (2017).
- MathFest – Chicago, IL (2017).
- SUMS (Symposium for Undergraduates in the Mathematical Sciences) – Brown University (2017).
- Joint Mathematics Meetings – Atlanta, Georgia (2017).
- Young Mathematicians Conference – The Ohio State University (2016).
- Summer Geometry/Topology Workshop – Stony Brook University (2016).

Academic Service and Outreach

- Academic Reviewing/Refereeing:
  - Journals: Enumerative Combinatorics and Applications, JRSS-B, TMLR, IEEE Trans. Inf. Theory.
  - Conferences: NeurIPS (2022, 2023 – "Top Reviewers", 2024), AISTATS 2024, ICML (2023, 2024, 2025), IJCAI 2024, ICLR 2024, COLT (2024, 2025).
- Designed and taught core competency exam review sessions for Columbia PhD Statistics students in 2021 and 2022.
- Graduate student mentor for Columbia Summer REU in Mathematical Modeling in 2021 and 2022.
- Teaching Assistant for 20 undergrad/grad courses in statistics and mathematics across Columbia and Stony Brook.

Awards

- DeepMind student travel grant for COLT 2022.
- William Lowell Putnam Math Competition Top 500.
- Kuga-Sah Memorial Award in Mathematics (outstanding junior, senior math undergraduate at Stony Brook University).
- Srivastav, Tucker & Weitzman Scholarship in Applied Mathematics.

Skills

- Programming: Python, Julia, Bash, R.
- Other Technical: SLURM, git, Linux sysadmin (Artix/Arch Linux and Ubuntu), LaTeX