Sunay Joshi

Curriculum Vitae

Contact

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Google Scholar: scholar.google.com/citations?user=8fTMwcUAAAAJ

Research Interests

Statistical machine learning; graphical and network models; high-dimensional asymptotic statistics; statistical uncertainty quantification; applied selective inference; foundations of LLM post-training; applied stochastic optimal control; applications to financial econometrics and macroeconometrics.

Education

University of Pennsylvania, Ph.D. in Applied Mathematics 2024–2028 (expected)

- Advisors: Edgar Dobriban and Hamed Hassani
- Committee: Edgar Dobriban, Hamed Hassani, Zhimei Ren, Aaron Roth
- Title: "Conformal and Selective Inference for Reliable AI"

Princeton University, A.B. in Mathematics with Highest Honors (*summa cum laude*) 2020–2024

- Minors: Applied and Computational Mathematics; Applications of Computing
- Senior Thesis Advisor: Allan Sly
- Title: "Alignment of Correlated Random Graphs"
- GPA: 3.98/4.00

Publications and Preprints

"Conformal Factuality with Learned Structure." Submitted.

Two working papers on (1) statistical proof verification via multiple hypothesis testing; (2) finite-sample theory of synthetic data for estimating linear models.

Sunay Joshi, Tao Wang, Hamed Hassani, and Edgar Dobriban. "Risk-Controlled Post-Processing of Decision Policies." Submitted to *NeurIPS*, 2026. arXiv:2605.06479.

Sunay Joshi, Yan Sun, Hamed Hassani, and Edgar Dobriban. "MultiRisk: Multiple Risk Control via Iterative Score Thresholding." Revise and resubmit at *JASA*. arXiv:2512.24587, 2025.

Georgy Noarov, Soham Mallick, Tao Wang, **Sunay Joshi**, Yan Sun, Yangxinyu Xie, Mengxin Yu, and Edgar Dobriban. "Foundations of Top-k Decoding for Language Models." *NeurIPS*, 2025. arXiv:2505.19371.

Sunay Joshi, Shayan Kiyani, George J. Pappas, Edgar Dobriban, and Hamed Hassani. "Conformal Inference under High-Dimensional Covariate Shifts via Likelihood-Ratio Regularization." *NeurIPS*, 2025. arXiv:2502.13030.

Gary Hu, Julian Gold, Uthsav Chitra, **Sunay Joshi**, and Benjamin J. Raphael. "Anomaly Detection in Spatial Transcriptomics via Spatially Localized Density Comparison." *Bioinformatics*, 41(Supplement 1):i493–i501, 2025. doi:10.1093/bioinformatics/btaf242.

Marissa Gee, Nicolas Gonzalez-Granda, **Sunay Joshi**, Nagaprasad Rudrapatna, Anne Somalwar, Stephen P. Ellner, and Alexander Vladimirsky. "Navigating the Landscape of Fear." *bioRxiv*, 2024. doi:10.1101/2024.08.15.608007.

Talks and Presentations

- **Poster Presentation**, STAI-X Conference, Harvard University August 2026
  "Risk-Controlled Post-Processing of Decision Policies."
- **Poster Presentation**, NeurIPS Conference, San Diego December 2025
  "Conformal Inference under High-Dimensional Covariate Shifts via Likelihood-Ratio Regularization."
- **Virtual Talk**, EnCORE Collaboration Workshop, UC San Diego September 2025
  "Conformal Inference under High-Dimensional Covariate Shifts via Likelihood-Ratio Regularization."
- **Group Talk**, Dobriban Stat-ML Reading Group, University of Pennsylvania January 2026
  "Introduction to LLM reasoning."

Teaching

- **Undergraduate Course Assistant**, Princeton University September 2023–December 2023
  - Served as one of two undergraduate assistants for MAT 340: Applied Algebra.
  - Led weekly problem sessions on introductory group theory and representation theory.

Reviewing

- Reviewer: *Journal of the American Statistical Association* (JASA), 2025; STAI-X 2026; NeurIPS 2026; OPT Workshop at NeurIPS 2026; ICML 2026 Workshop on AI4Research.

Service and Outreach

- **Volunteer**, ICML 2026 Workshop on AI4Research 2026
- **Mentor**, Directed Reading Program (DRP) Spring 2026, Fall 2026
  - Topics: high-dimensional statistics, distribution-free statistics.
- **Organizer**, Dobriban Stat-ML Reading Group September 2024–April 2025
  - Organized logistics for Prof. Edgar Dobriban's statistics and machine learning reading group.
  - Selected speakers for weekly meetings, managed shared materials, and made announcements.
- **Volunteer**, University of Pennsylvania Math Circles September 2024
  - Provided after-school mathematics enrichment activities for students at West Philadelphia High School.
- **Advising Chair**, Princeton Mathematics Club April 2023–May 2024
  - Organized course advising sessions for undergraduates in the mathematics department.
  - Organized the Mentoring Möbius program connecting undergraduates with mathematics graduate students.
- **Problem Czar**, Princeton Math Contest 2022
  - Served as lead problem writer for Princeton's annual high school mathematics contest (PUMaC).
  - Held regular problem-writing meetings, selected final contest problems, and wrote 48 problems over four years.

Awards and Honors

- Sigma Xi, 2024: elected to national science honor society.
- Phi Beta Kappa, 2024: elected to the oldest academic honor society in the United States.
- NSF Graduate Research Fellowship Program Honorable Mention, 2024.
- Andrew H. Brown Prize, 2023: awarded by the Princeton Mathematics Department to outstanding juniors in mathematics.
- Class of 1861 Prize, 2022: awarded by Princeton to the sophomore with the best record on the Putnam Examination.
- Shapiro Prize for Academic Excellence, 2021: recognizes outstanding academic achievement by Princeton undergraduates in their first or second years of study.
- Rank 150, William Lowell Putnam Mathematical Competition, 2021.
- Silver Medalist, USA Physics Olympiad, 2019.
- Qualifier, USA Junior Math Olympiad, 2018.

Technical Skills

- *Programming*: Python, Java, C++, Linux, Bash, GitHub, agentic programming workflows.
- *Typesetting*: LaTeX.
- *Languages*: English (native), Spanish (intermediate), Hindi (beginner).