Yuchen Wu

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GitHub: github.com/wuyc0114

Education / Experience

University of Pennsylvania	Philadelphia, PA
Postdoctoral researcher	2023–current
Stanford University	Stanford, CA
Ph.D. in Statistics, Advisor: Andrea Montanari	2018–2023
Ph.D. Minor in Management Science and Engineering	2020–2023
M.S. in Statistics	2021–2022
Tsinghua University	Beijing, China
B.S. in Mathematics, GPA: 3.92/4.00, Rank: 2/96	2014–2018

Research interests

- Diffusion model and sampling
- High-dimensional statistical inference
- Algorithm design under budget constraints
- Data-driven decision making

Journal publications

[1] A. Montanari* and **Y. Wu***, "Adversarial examples in random neural networks with general activations", *Mathematical Statistics and Learning*, vol. 6, no. 1, pp. 143–200, 2023.

[2] Z. Wei, S. Alam, M. Verma, M. Hilderbran, **Y. Wu**, B. Anderson, D. E. Ho, and J. Suckale, "Integrating water quality data with a bayesian network model to improve spatial and temporal phosphorus attribution: Application to the maumee river basin", *Journal of Environmental Management*, vol. 360, p. 121 120, 2024.

[3] A. Montanari* and **Y. Wu***, "Statistically optimal first order algorithms: A proof via orthogonalization", *Information and Inference: A Journal of the IMA (to appear)*, 2024+.

[4] A. Montanari* and **Y. Wu***, "Fundamental limits of low-rank matrix estimation with diverging aspect ratios", *Annals of Statistics (to appear)*, 2024+.

[5] **Y. Wu*** and K. Zhou*, "Sharp analysis of power iteration for tensor pca", *Journal of Machine Learning Research*, vol. 25, no. 195, pp. 1–42, 2024.

Conference publications

[1] M. Celentano*, A. Montanari*, and **Y. Wu***, "The estimation error of general first order methods", in *Conference on Learning Theory*, PMLR, 2020, pp. 1078–1141.

[2] **Y. Wu**, J. Tardos, M. Bateni, A. Linhares, F. M. Goncalves de Almeida, A. Montanari, and A. Norouzi-Fard, "Streaming belief propagation for community detection", *Advances in Neural Information Processing Systems*, vol. 34, 2021.

[3] **Y. Wu*** and K. Zhou*, "Lower bounds for the convergence of tensor power iteration on random overcomplete models", in *The Thirty Sixth Annual Conference on Learning Theory*, PMLR, 2023, pp. 3783–3820.

[4] P. Patil*, **Y. Wu***, and R. Tibshirani, "Failures and successes of cross-validation for early-stopped gradient descent", in *International Conference on Artificial Intelligence and Statistics*, PMLR, 2024, pp. 2260–2268.

[5] **Y. Wu**, M. Chen, Z. Li, M. Wang, and Y. Wei, "Theoretical insights for diffusion guidance: A case study for gaussian mixture models", in *Forty-first International Conference on Machine Learning*.

Preprints

[1] A. Montanari* and **Y. Wu***, "Provably efficient posterior sampling for sparse linear regression via measure decomposition", *arXiv preprint arXiv:2406.19550*, 2024
Major revision at Journal of the American Statistical Association.

[2] S. Mei* and **Y. Wu***, "Deep networks as denoising algorithms: Sample-efficient learning of diffusion models in high-dimensional graphical models", *arXiv preprint arXiv:2309.11420*, 2023
Major revision at IEEE Transactions on Information Theory.

[3] A. Montanari* and **Y. Wu***, "Posterior sampling from the spiked models via diffusion processes", *arXiv preprint arXiv:2304.11449*, 2023.

[4] **Y. Wu**, C. Yuxin, and Y. Wei, "Stochastic runge-kutta methods: Provable acceleration of diffusion models", *preprint*, 2024.

[5] **Y. Wu**, Y. Zhuoran, and Z. Xinyi, "Conquering online principal-agent model in the face of strategic behavior and information asymmetry", *preprint*, 2024.

* Alphabetical

Scholarships and Awards

- ICSA China Conference Travel Award   2023
- SIAM Student Travel Award   2022
- National Scholarship, Tsinghua University   2015–2017
- Chinese Mathematical Olympiad, Second prize   2014
- Chinese Girls' Mathematical Olympiad, 3rd place   2013

Talks and presentations

1. INFORMS Applied Probability Conference   July, 2025
2. Applied Probability Seminar, Columbia University   October, 2024
3. FDS Conference: Recent Advances and Future Directions for Sampling, Yale University   October, 2024
4. INFORMS Annual Meeting   October, 2024
5. Cornell Young Researchers Workshop   October, 2024
6. S. S. Wilks Memorial Seminar in Statistics, Princeton University   October, 2024
7. Joint Statistical Meetings   August, 2024
8. The 41st International Conference on Machine Learning (poster)   July, 2024
9. Youth in High Dimensions workshop at ICTP   May, 2024

10. Professor Weijie Su's group meeting, University of Pennsylvania — May, 2024
11. The 27th International Conference on Artificial Intelligence and Statistics (oral) — May, 2024
12. The 58th Annual Conference on Information Sciences and Systems — March, 2024
13. Measure transport, diffusion processes and sampling (poster), Flatiron Institute — December, 2023
14. Professor Tom Berrett and Professor Yi Yu's group meeting, University of Warwick — November, 2023
15. IMS Young Mathematical Scientists Forum, University of Singapore — November, 2023
16. Wharton lunch seminar — November, 2023
17. Penn/Temple Probability Seminar — October, 2023
18. INFORMS Annual Meeting — October, 2023
19. University of the Chinese Academy of Sciences — October, 2023
20. Mathematical and Scientific Foundations of Deep Learning Annual Meeting (poster) — September, 2023
21. Theory lunch, Stanford University — August, 2023
22. University of Science and Technology of China — July, 2023
23. Zhongnan University of Economics and Law — July, 2023
24. Conference on Learning Theory 2023 — July, 2023
25. ICSA 2023 China Conference — July, 2023
26. Shenzhen Conference on Random Matrix Theory and Applications — June, 2023
27. Yuxin Chen's group meeting — May, 2023
28. Ryan Tibshirani's group meeting — April, 2023
29. MoDL meeting — March, 2023
30. Liza Levina and Ji Zhu's group meeting, University of Michigan — January 2023
31. Institute for the Foundations of Data Science, Yale University — December 2022
32. Information Systems Laboratory Colloquium at Stanford University — December 2022
33. Stanford Berkeley Joint Colloquium — November 2022
34. SIAM Conference on Mathematics of Data Science — September 2022
35. TBSI Workshop on Learning Theory, Young Researchers' Forum session — August 2022
36. 2022 ICSA China Conference — July 2022
37. AI TIME PhD, Tsinghua University — February 2022
38. Yuling Jiao's group meeting, Wuhan University — January 2022
39. Conference on Neural Information Processing Systems — December 2021
40. No-retreat day student seminar, Department of Statistics, Stanford University — November 2021
41. 2021 Joint Statistical Meetings, speed presentation — August 2021
42. Conference on Learning Theory — July 2020

Teaching

As an instructor at University of Pennsylvania:

- STAT 1010 Introductory Business Statistics — Summer 2024

As a teaching assistant at Stanford University:

- STATS 200 - Statistical Inference — Autumn 2018-2019, 2020-2021
- STATS 216 - Introduction to Statistical Learning — Winter 2018-2019
- STATS 60 - Introduction to Statistical Methods — Summer 2018-2019, 2019-2020, 2021-2022

- Math 230A / Stat 310A - Theory of Probability   Autumn 2019-2020
- STATS 218 - Introduction to Stochastic Processes II   Spring 2019-2020
- Math 230B / Stat 310B - Theory of Probability   Winter 2020-2021
- Math 230C / Stat 310C - Theory of Probability   Spring 2020-2021
- STATS 214 / CS 229M - Machine Learning Theory   Autumn 2021-2022
- STATS 217 - Introduction to Stochastic Processes I   Winter 2021-2022
- STATS 203 - Introduction to Regression Models and Analysis of Variance   Spring 2021-2022
- STATS 305B - Applied Statistics II   Winter 2022-2023

VISITING EXPERIENCE

- Visiting graduate student at Simons Institute
  Program: Geometric Methods in Optimization and Sampling   Fall 2021

- Visiting graduate student at the Institute for Advanced Study   December 2022

PROFESSIONAL SERVICE

Journal reviewer:
Annals of Statistics, Journal of the American Statistical Association, Biometrika, Annals of Applied Probability, Jounral of Machine Learning Research, IEEE Transactions on Information Theory, Journal of Statistical Physics, SIAM Journal on Mathematics of Data Science, IEEE Transactions on Big Data, Journal of Medical Internet Research

Conference reviewer:
Conference on Learning Theory (COLT), Conference on Neural Information Processing Systems (Neurips), International Conference on Machine Learning (ICML), International Conference on Learning Representations (ICLR) International Conference on Artificial Intelligence and Statistics (AISTATS), International Conference on Algorithmic Learning Theory (ALT), IEEE Symposium on Foundations of Computer Science (FOCS), IEEE International Symposium on Information Theory (ISIT), International Colloquium on Automata, Languages and Programming (ICALP), Conference on Artificial Intelligence (AAAI)

Session organizer:

- Advances in the Theory of Modern Sampling Algorithms   Joint Statistical Meetings 2024

SKILLS

- Languages: Mandarin (native), English (advanced)

  - 112 in Toefl IBT test, November 2016
  - 165 (verbal) + 170 (quantity) + 4 in GRE test, October 2016

- Programming: Python, R, Matlab, C++