Yuchen Wu

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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
- High-dimensional statistics
- Deep learning theory
- Information theory

Publications and Preprints

[1] 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.

[2] 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.

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

[4] **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.

[5] A. Montanari and **Y. Wu**, "Fundamental limits of low-rank matrix estimation with diverging aspect ratios", *arXiv preprint arxiv:2211.00488*, 2022.

[6] A. Montanari and **Y. Wu**, "Statistically optimal first order algorithms: A proof via orthogonalization", *arXiv preprint arXiv:2201.05101*, 2022.

[7] Z. Wei, M. Verma, **Y. Wu**, S. Alam, B. Anderson, D. Ho, and J. Suckale, "Attributing sources of surface water pollutants in the maumee river basin using network modeling", in *AGU Fall Meeting 2021*, AGU, 2021.

[8] **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.

[9] 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.

* Author names are ordered alphabetically for most of my papers

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. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives
   University of the Chinese Academy of Sciences *October, 2023*
2. Posterior Sampling from the Spiked Models via Diffusion Processes (poster)
   Mathematical and Scientific Foundations of Deep Learning Annual Meeting *September, 2023*
3. Posterior Sampling from the Spiked Models via Diffusion Processes
   Theory lunch, Stanford University *August, 2023*
4. Posterior Sampling from the Spiked Models via Diffusion Processes
   University of Science and Technology of China *July, 2023*
5. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives
   Zhongnan University of Economics and Law *July, 2023*
6. Lower Bounds for the Convergence of Tensor Power Iteration on Random Overcomplete Models
   Conference on Learning Theory 2023 *July, 2023*
7. Posterior Sampling from the Spiked Models via Diffusion Processes
   ICSA 2023 China Conference *July, 2023*
8. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives
   Shenzhen Conference on Random Matrix Theory and Applications *June, 2023*
9. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives
   Yuxin Chen's group meeting *May, 2023*
10. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives
    Ryan Tibshirani's group meeting *April, 2023*
11. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives
    MoDL meeting *March, 2023*
12. Fundamental Limits of Low-Rank Matrix Estimation with Diverging Aspect Ratios
    Liza Levina and Ji Zhu's group meeting, University of Michigan *January 2023*
13. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives
    Institute for the Foundations of Data Science, Yale University *December 2022*
14. Fundamental Limits of Low-Rank Matrix Estimation with Diverging Aspect Ratios
    Information Systems Laboratory Colloquium at Stanford University *December 2022*
15. Fundamental Limits of Low-Rank Matrix Estimation with Diverging Aspect Ratios
    Stanford Berkeley Joint Colloquium *November 2022*

16. Adversarial Examples in Random Neural Networks with General Activations
SIAM Conference on Mathematics of Data Science *September 2022*
17. Adversarial Examples in Random Neural Networks with General Activations
TBSI Workshop on Learning Theory, Young Researchers' Forum session *August 2022*
18. Adversarial Examples in Random Neural Networks with General Activations
2022 ICSA China Conference *July 2022*
19. Streaming Belief Propagation for Community Detection
AI TIME PhD, Tsinghua University *February 2022*
20. Streaming Belief Propagation for Community Detection
Yuling Jiao's group meeting, Wuhan University *January 2022*
21. Streaming Belief Propagation for Community Detection
Conference on Neural Information Processing Systems *December 2021*
22. Asymmetric Estimation of Low-Rank Matrix: Statistical and Computational Limits
No-retreat day student seminar, Department of Statistics, Stanford University *November 2021*
23. Asymmetric Estimation of Low-Rank Matrix: Statistical and Computational Limits
2021 Joint Statistical Meetings, speed presentation *August 2021*
24. The Estimation Error of General First Order Methods
Conference on Learning Theory *July 2020*

Teaching

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

Reviewer for Conference on Learning Theory (2023), International Colloquium on Automata, Languages and Programming (2023), IEEE International Symposium on Information Theory (2023) IEEE Transactions on Information Theory, Neurips (2023), IEEE Transactions on Big Data, International Conference on Algorithmic Learning Theory (2024), International Conference on Learning Representations (2024).

Skills

- Languages: Mandarin (native), English (advanced)
  - 112 in Tofel IBT test, November 2016
  - 165 (verbal) + 170 (quantity) + 4 in GRE test, October 2016
- Programming: Python, R, Matlab, C++