

# Mengxin(Maxine) Yu

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## EXPERIENCE

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### University of Pennsylvania

Jul. 2023 - Present

*Postdoctoral Researcher; Advisor: Dylan S. Small*

Department of Statistics and Data Science

## EDUCATION

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### Princeton University

Sep. 2018 - May. 2023

*Ph.D. from ORFE (Statistics track); Advisor: Jianqing Fan*

- GPA: 4.0/4.0
- Recipient of the *SEAS Award for Excellence at Princeton* (Highest level honor for advanced graduate students).

### University of Science and Technology of China (USTC)

Sep. 2014 - July. 2018

*B.S. from Department of Statistics*

- Major GPA: 4.17/4.30; Rank: 1st/105.
- Graduated with *summa cum laude* (Guo Moruo Scholarship, Highest honor at USTC, 1%).

## RESEARCH INTEREST

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- My research focuses on statistical estimation, inference, and decision-making, with applications spanning diverse fields such as social science, operations research, machine learning, and public health. Specifically, I am interested in developing novel statistical **methods** and investigating relevant **applications** in the directions of:
  - Uncertainty-Aware Human Preference Study (entity ranking estimation and inference); Papers [3, 11, 12, 13].
  - Causal inference (instrumental variable, test-negative design, cluster randomized trial, matching, etc.); Papers [1, 2, 4, 6, 8, 21].
  - Statistical Aspects of AI-safety and Data-driven Decision-making (uncertainty quantification, calibration, dynamic pricing and reinforcement learning); Papers [6, 7, 8, 9, 16].
  - Robust High-dimensional Statistical Estimation and Inference; Papers [14, 15, 17, 18].
- I am also collaborating with clinicians and neuroscientists at the Queen Elizabeth Hospital in Malawi to study statistical application problems in **cerebral malaria**; Papers [5, 10, 19, 20].

## SELECTED AWARDS

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- New Researcher Travel Award, Institute of Mathematical Statistics (IMS), 2024.
- Hannan Graduate Student Travel Award, Institute of Mathematical Statistics (IMS), 2023.
- Best Paper Award, B&E Statistics Section, American Statistical Association (ASA), 2023.
- SEAS Award for Excellence, School of Engineering, Princeton University, 2022. (Highest level honor for advanced graduate students at Princeton).
- Best Poster Award, ICSA Applied Statistics Symposium, ICSA, 2022.

- Best Poster Award, Conference on Advances in Bayesian and Frequentist Theory, Rutgers University, 2022.
- Princeton Graduate Student Fellowship, Princeton University, 2018-2019.
- Graduated with *summa cum laude* (Guo Moruo Scholarship, 1%), USTC, 2018.
- Outstanding Graduation Award, USTC, 2018.
- Best Graduation Paper Award (1%), USTC, 2018.
- Gold Award of Outstanding Student Scholarship, USTC (<3%), 2017.

## PUBLICATIONS AND PREPRINTS

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- \* The papers are listed in decreasing chronological order by preprints, revisions, and publications.
  - \* I use “\*” after paper names to mark those papers where I am the main contributor or co-main contributor; I use “\*\*” to denote papers where I supervise junior students to conduct the research.
1. **Efficient Estimation of a Functional of Counterfactuals under Multiplicative Instrumental Variable Model\***, Joint work with Eric, J. Tchetgen Tchetgen, Yonghoon Lee. *Available by Request*.
  2. **Test-Negative Designs with Multiple Testing Sources\***, Joint work with Nicholas P. Jewell; Journal Submitted, Under Review, 2024+
  3. **Covariate-Assisted Entity Ranking with Sparse Intrinsic Scores\*\***, Joint work with Jianqing Fan, Jikai Hou. *Journal of American Statistical Association (JASA)*, R&R, 2024+
  4. **Test-Negative Designs with Various Reasons for Testing: Bias and Solution\***, Joint work with Bingkai Wang, Kendrick Li, Nicholas P. Jewell, Eric J. Tchetgen Tchetgen, Dylan S. Small, and Xu Shi; *Epidemiology (Epi)*, *Major Revision Requested*, 2024+
  5. **Advancing Understanding of Cerebrovascular Hemodynamic Perturbations in Pediatric Cerebral Malaria using a Modified Critical Closing Pressure Evaluation—a prospective, observational study**, Joint work with Madiha Q Raees, Hunter J Wynkoop, Dylan S. Small, Karl B Seydel, Montfort Bernard Gushu, Tusekile Phiri, Sylvester June, Terrie E. Taylor, Nicole F O’Brien; *Revision Requested*, 2024+
  6. **Conformal Causal Inference for Cluster Randomized Trials: Model-Robust Inference without Asymptotic Approximations**, Joint work with Bingkai Wang, Fan Li, *Biometrics (Biom)*, *Major Revision Requested*, 2024+
  7. **SymmPI: Predictive Inference for Data with Group Symmetries\***, Joint work with Edgar Dobriban; *Journal of the Royal Statistical Society: Series B (JRSSB)*, *Major Revision Requested*, 2024+
  8. **Strategic Decision-Making in the face of Private Information: Provably Efficient RL with Algorithmic Instruments\***, Joint work with Jianqing Fan, Zhuoran Yang; *The Annals of Statistics (AOS)*, R&R, In Revision, 2024+.
    - This paper received the ASA Best Student Paper Award at the Business and Economic Statistics Session, 2023.
    - This paper received the IMS Hannan Graduate Student Travel Award, 2023.

9. **Uncertainty in Language Models: Assessment through Rank-Calibration**, Joint work with Xinmeng Huang, Shuo Li, Matteo Sesia, Hamed Hassani, Insup Lee, Osbert Bastani, Edgar Dobriban; *Empirical Methods in Natural Language Processing (EMNLP)*, Accepted, 2024, to appear.
  - Preliminary version is accepted to *TrustNLP Workshop 2024*
10. **Admission Point of Care Testing for the Clinical Care of Children with Cerebral Malaria**, Joint work with David Wichman, Geoffrey Guenther, Nthambose M. Simango, Dylan S. Small, Olivia D. Findorff, Nathaniel O. Amoah, Rohini Dasan, Karl B. Seydel, Douglas G. Postels, Nicole F. O'Brien, etc; *Tropical Medicine and Infectious Disease*, Accepted, 2024, to appear.
11. **Uncertainty Quantification of MLE for Ranking with Covariates \*\***, Joint work with Jianqing Fan, Jikai Hou; *Journal of Machine Learning Research (JMLR)*, Accepted, 2024, to appear.
12. **Spectral Ranking Inferences Based on General Multiway Comparisons\***, Joint work with Jianqing Fan, Weichen Wang, and Zhipeng Lou; *Operations Research (OR)*, Accepted Subject to Minor Revision (conditional acceptance), 2024.
  - This paper received the IMS New Researcher Travel Award, 2024.
13. **Ranking Inferences Based on the top Choice of Multiway Comparisons\***, Joint work with Jianqing Fan, Weichen Wang, Zhipeng Lou; *The Journal of the American Statistical Association (JASA)*, Accepted, 2024, to appear.
14. **Are Latent Factor Regression and Sparse Regression Adequate?\***, Joint work with Jianqing Fan, Zhipeng Lou; *Journal of the American Statistical Association (JASA)*, 2024, **119**(546), 1076-1088.
  - This paper received the ICSA Best Student Poster Award, 2022.
15. **Robust High-dimensional Tuning Free Multiple Testing\***, Joint work with Jianqing Fan, Zhipeng Lou; *The Annals of Statistics (AOS)*, 2023, **51**(5), 2093-2115.
16. **Policy Optimization Using Semiparametric Models for Dynamic Pricing\***, Joint work with Jianqing Fan, Yongyi Guo; *Journal of the American Statistical Association (JASA)*, 2023, **119**(545), 552-564.
17. **Understanding Implicit Regularization in Over-Parameterized Single Index Model\***, Joint work with Jianqing Fan, Zhuoran Yang; *Journal of the American Statistical Association (JASA)*, 2023, **118**(544), 2315-2328.
18. **Statistical Learning of the Worst Regional Smog Extremes with Dynamic Conditional Modeling\***, Joint work with Zhengjun Zhang, Lu Deng; *Atmosphere*, 2020, **11**(6), 665.

## SELECTED PAPERS IN PREPARATION

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19. **Predictors of Progression for Cerebral Malaria\***, Joint work with Dylan S. Small, Karl Seydel, etc. *Draft in preparation*
20. **Causal Pathway Hypothesis Testing on Cerebral Malaria\***, Joint work with Dylan S. Small, Mikhail Traskin, Karl Seydel, et al. *Draft in preparation*.

21. **Matching for Evaluating Dynamic Treatment Regimes\***, joint work with Dylan S. Small, Ruoqi Yu, and Yingqi Zhao. *Draft in preparation.*

## SELECTED PRESENTATIONS

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- Informs Annual Meeting; *October 2024, Seattle, Washington, USA (Invited by Shuangning Li).*
- Joint Statistical Meeting (JSM) ; *August 2024, Portland, Oregon, USA.*
- Statistics Seminar, Stanford University; *July 2024, Stanford, California, USA (Invited by Shuangping Li).*
- The Western North American Region of the International Biometric Society Conference (WNAR); *June 2024, Fort Collins, Colorado, USA (Invited by Matteo Sesia).*
- American Causal Inference Conference (ACIC), *University of Washington; May 2024, Seattle, Washington, USA (Poster).*
- Joint Statistical Meeting (withdrawn b/c visa issue); *August, 2023, Toronto, Canada (Best Student Paper Award, B&E Statistics Section, Invited Presentation).*
- Pattern Theory Seminar, Department of Applied Math, Brown University; *April 2023, Providence, Rhode Island, USA (Invited by Kun Meng).*
- Informs Annual Meeting; *October 2022, Indianapolis, Indiana, USA (Invited by Hansheng Jiang).*
- Cornell ORIE Young Researcher Workshop; *October 2022, Ithaca, NY, USA. (Invited by Shane G. Henderson)*
- Joint Statistical Meeting ; *August 2022, Washington D.C., USA.*
- ICSA China 2022 Conference; *July 2022, Virtual, China. (Invited by Xin Tong)*
- ICSA Applied Statistics Symposium; *June 2022, Gainesville, Florida, USA (Poster).*
- Statistics in the Big Data Era ; *June 2022, Berkeley, California, USA (Poster).*
- NYC Optimization Day; *April 2022, Cornell Tech, Roosevelt Island, New York, USA (Poster).*
- Conference on Advances in Bayesian and Frequentist Theory; *April, 2022 Rutgers University, NJ, USA (Poster).*
- Perspectives in Statistical Modeling and Inference ; *December 2021, The Wharton School, Pennsylvania, USA (Poster).*
- TOPML Workshop; *April 2021, Virtual, USA.*
- Two Sigma's Inaugural PhD Symposium [[Link](#)]; *December 2020, Virtual, USA. (Invited by the Technology Group in Two Sigma)*

## TEACHING EXPERIENCE

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- ORF245: Fundamentals of Statistics; *Spring 2022 (Head TA), Fall 2020, Fall 2019.*
- ORF309-EGR309: Probability and Stochastic Systems; *Spring 2021, Spring 2020.*
- ORF363: Computing and Optimization; *Fall 2021.*

## PROFESSIONAL SERVICES

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- **Reviewer:** Annals of Statistics (AOS), Journal of American Statistical Association (JASA), Journal of the Royal Statistical Society, Series B (JRSSB), Journal of Machine Learning Research (JMLR), IEEE Transactions on Information Theory (IEEE-TIT), Information and Inference: A Journal of the IMA, IEEE Transactions on Systems, Man, and Cybernetics: Systems, Journal of Computational and Graphical Statistics (JCGS), Statistica Sinica, Statistics and Computing, International Statistics Review, Frontiers in Applied Mathematics and Statistics, Stat, Journal of Data Science, Neural Information Processing Systems (Neurips, 2022, 2023, 2024), International Conference on Machine Learning (ICML, 2022, 2023, 2024), International Conference on Learning Representations (ICLR, 2024, 2025), Artificial Intelligence and Statistics (AISTATS, 2025), American Causal Inference Conference (ACIC, 2024), Top Machine Learning Workshop (TOPML, 2020).
- **Organizer, Session Chair or Committee Member:**
  - Session Chair for Joint Statistical Meeting (JSM), Section on Statistical Learning and Data Science, 2024.
  - Session Chair for INFORMS Annual Meeting, Data Mining Cluster, 2024.
  - Committee Member for Statistical Foundations of Data Science and Their Applications (Jianqing Fan's 60 Birthday Conference), 2023.
  - Organizer for Statistics Reading Group at Princeton, 2021-2022.
  - Committee Member for the Seventh Princeton Statistics Day (Conference), 2021.

## MENTORSHIP

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- Jikai Hou, Ph.D. Candidate at Princeton University (Co-mentored with Jianqing Fan).
  - Project: Uncertainty Quantification of MLE for Ranking with Covariate.
  - Project: Covariate-Assisted Entity Ranking with Sparse Intrinsic Scores.
- Xiaonan Zhu, Ph.D. Candidate at Princeton University (Co-mentored with Jianqing Fan).
  - Project: Robust Multiple Testing under Cross-Sectional Correlation.
- Jonathan Mehrotra, Undergraduate at University of Pennsylvania (Co-mentored with Dylan Small)
  - Project: Cerebral Malaria Severity Study through Augmentation Index from TCD Waveform.