

CONTACT INFORMATION	Toyota Technological Institute at Chicago 6045 South Kenwood Ave Chicago, IL 60637 Phone: 203-305-9456	✉ tianhao.wang@ttic.edu 🌐 https://tianhaowang.ttic.edu 🌐 Linkedin 🌐 Google Scholar
EMPLOYMENT	Research Assistant Professor, Toyota Technological Institute at Chicago	2024 – present
EDUCATION	Ph.D. in Statistics and Data Science, Yale University	2018 – 2024
	• Advisor: Prof. Zhou Fan	
	B.S. in Mathematics, University of Science and Technology of China (USTC)	2014 – 2018
	• B.E. in Computer Science (dual)	
EXPERIENCE	Student researcher, Google DeepMind	09/2023 – 11/2023
	Research intern, Google DeepMind	06/2023 – 08/2023
PUBLICATIONS AND PREPRINTS	(*: equal contribution)	
	1. Heejune Sheen, Siyu Chen, Tianhao Wang, and Harrison H. Zhou. “Implicit Regularization of Gradient Flow on One-Layer Softmax Attention”. Available at arXiv:2403.08699.	
	2. Angeliki Giannou, Liu Yang, Tianhao Wang, Dimitris Papailiopoulos, and Jason D. Lee. “How well can Transformers emulate in-context Newton’s method?” Available at arXiv:2403.03183.	
	3. Xinyi Zhong*, Tianhao Wang*, and Zhou Fan. “Approximate Message Passing for orthogonally invariant ensembles: Multivariate non-linearities and spectral initialization”. <i>Information and Inference</i> , to appear. Available at arXiv:2110.02318.	
	4. Siyu Chen, Heejune Sheen, Tianhao Wang, and Zhuoran Yang. “Training dynamics of multi-head softmax attention for in-context learning: emergence, convergence, and optimality”. <i>Conference on Learning Theory (COLT)</i> , 2024. Available at arXiv:2402.19442.	
	5. Zhou Fan, Roy R. Lederman, Yi Sun, Tianhao Wang, Sheng Xu. “Maximum likelihood for high-noise group orbit estimation and single-particle cryo-EM”. <i>The Annals of Statistics</i> , 2024. Available at arXiv:2107.01305.	
	6. Tianhao Wang, Xinyi Zhong, and Zhou Fan. “Universality of Approximate Message Passing algorithms and tensor networks”. <i>The Annals of Applied Probability</i> , to appear. Available at arXiv:2206.13037.	
	7. Runzhe Wang, Sadhika Malladi, Tianhao Wang, Kaifeng Lyu, and Zhiyuan Li. “The Marginal Value of Momentum for Small Learning Rate SGD”. <i>International Conference on Learning Representations (ICLR)</i> , 2024. Available at arXiv:2307.15196.	
	8. Zhou Fan, Yi Sun, Tianhao Wang, Yihong Wu. “Likelihood landscape and maximum likelihood estimation for the discrete orbit recovery model”. <i>Communications on Pure and Applied Mathematics</i> , 2023. Available at arXiv:2004.00041.	
	9. Ruitu Xu, Yifei Min, and Tianhao Wang. “Noise-adaptive Thompson sampling for linear contextual bandits”. <i>In Advances in Neural Information Processing Systems (NeurIPS)</i> , 2023.	
	10. Yifei Min, Jiafan He, Tianhao Wang, Quanquan Gu. “Cooperative multi-agent reinforcement learning: Asynchronous communication and linear function approximation”. <i>International Conference on Machine Learning (ICML)</i> , 2023. Available at arXiv:2305.06446.	
	11. Ruitu Xu, Yifei Min, Tianhao Wang, Michael I. Jordan, Zhaoran Wang, Zhuoran Yang. “Finding regularized competitive equilibria of heterogeneous agent macroeconomic models via reinforcement learning”. <i>International Conference on Artificial Intelligence and Statistics (AISTATS)</i> , 2023. Available at arXiv:2303.04833.	

12. Zhiyuan Li, Tianhao Wang, Dingli Yu. “Fast mixing of stochastic gradient descent with normalization and weight decay”. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2022.
13. Zhiyuan Li*, Tianhao Wang*, Jason D. Lee, Sanjeev Arora. “Implicit bias of gradient descent on reparametrized models: on equivalence to mirror descent”. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2022. Available at arXiv:2207.04036.
14. Jiafan He*, Tianhao Wang*, Yifei Min*, Quanquan Gu. “A simple and provably efficient algorithm for asynchronous federated linear bandits”. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2022. Available at arXiv:2207.03106.
15. Yifei Min, Tianhao Wang, Ruitu Xu, Zhaoran Wang, Michael I. Jordan, Zhuoran Yang. “Learn to match with no regret: Reinforcement learning in Markov matching market”. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2022 (**Oral**). Available at arXiv:2203.03684.
16. Yifei Min, Jiafan He, Tianhao Wang, Quanquan Gu. “Learning stochastic shortest path with linear function approximation”. *International Conference on Machine Learning (ICML)*, 2022. Available at arXiv:2110.12727.
17. Zhiyuan Li, Tianhao Wang, Sanjeev Arora. “What happens after SGD reaches zero loss? – A mathematical framework”. *International Conference on Learning Representations (ICLR)*, 2022 (**Spotlight**). Available at arXiv:2110.06914.
18. Pamela L Valentino, Tianhao Wang, Veronika Shabanova, Vicky Lee Ng, John C Bucuvalas, Amy G Feldman, Regino P Gonzalez-Peralta, Nitika Arora Gupta, Tamir A Miloh, Saeed Mohammad, Erika Pace, Shikha S Sundaram, Nada A Yazigi, Kyle Soltys, Society of Pediatric Liver Transplantation (SPLIT). “North American biliary stricture management strategies in children post liver transplant: multicenter analysis from the SPLIT Registry”. *Liver Transplantation*, 2021.
19. Yifei Min*, Tianhao Wang*, Dongruo Zhou, Quanquan Gu. “Variance-aware off-policy evaluation with linear function approximation”. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2021. Available at arXiv:2106.11960.
20. Tianhao Wang*, Dongruo Zhou*, Quanquan Gu. “Provably efficient reinforcement learning with linear function approximation under adaptivity constraints”. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2021. Available at arXiv:2101.02195.
21. Pan Xu*, Tianhao Wang*, Quanquan Gu. “Continuous and discrete-time accelerated stochastic mirror descent for strongly convex functions”. *International Conference on Machine Learning (ICML)*, 2018.
22. Pan Xu*, Tianhao Wang*, Quanquan Gu. “Accelerated stochastic mirror descent: From continuous-time dynamics to discrete-time algorithms”. *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2018.

HONORS AND AWARDS

- Leonard F. Savage Prize for best written work Yale, 2024
- Conference Travel Fellowship Yale, 2023
- Student Poster Competition Award Rutgers University, 2023
 - At Conference on Recent Advances in Statistics and Data Science
- NeurIPS 2022 top reviewer NeurIPS, 2022
- Wedworth W. Clarke Fellowship Yale, 2021
- ICML 2018 travel award ICML, 2018
- Huang Yu Memorial Scholarship USTC, 2017

INVITED TALKS AND SEMINARS	• Joint Statistical Meetings	08/2024
	• University of Notre Dame, ACMS Colloquium	02/2024
	• UIUC, Statistics Seminar	02/2024
	• Columbia University, Statistics Seminar	01/2024
	• UCSD, Halıcıoğlu Data Science Institute, Special Seminar Series	01/2024
	• UC Davis, Statistics Seminar	01/2024
	• UCSD, Department of Mathematics Colloquium	12/2023
	• INFORMS Annual Meeting	10/2023
	– Universality of Approximate Message Passing algorithms and tensor networks	
	• International Conference on Machine Learning	07/2022
	– Learning stochastic shortest path with linear function approximation	
	– Implicit bias of gradient descent on reparameterized models	
TEACHING EXPERIENCE	Teaching assistant for	
	• High-Dimensional Phenomena in Statistics and Learning	Spring 2023
	• Intermediate Machine Learning	Spring 2022
	• Statistical Inference	Fall 2020, Fall 2021
	• Information Theory	Spring 2021
	• Probability and Statistics	Fall 2019
	• Stochastic Processes	Spring 2019, Spring 2020
SERVICE	Journal reviewer for	
	• IEEE Transactions on Information Theory	
	• The Annals of Statistics	
	Conference reviewer for	
	• AISTATS 2022, 2023, 2024	
	• ECML 2023	
	• ICLR 2023, 2024	
	• ICML 2022, 2023, 2024	
	• IEEE ITW 2023	
	• NeurIPS 2022, 2023	