Xinwen (Ellen) Zhang

Ph.D. Student at Temple University

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EDUCATION

Temple University Philadelphia, USA
Ph.D. in Computer and Information Science *Aug.2022 – May.2027*
Advisor: Prof. Hongchang Gao
Research Interest: Designing large-scale optimization algorithms, including stochastic optimization beyond minimization, distributed optimization, and optimization for large language models.

Tongji University Shanghai, China
B.S. in Mathematics *Sep.2017 – Jun.2021*

AWARDS

- Gold Reviewer, ICML 2026.
- **Outstanding Graduate Research Assistant Award**, Department of Computer and Information Sciences, Temple University, 2026.
- **Female Student Award** in Data Science, IEEE International Conference on Data Mining, 2025.
- ICDM 2025 Student Travel Award, ICML 2024 Travel Award, WiML 2023 Travel Funding, NeurIPS 2023 Scholar Award, KDD 2023 Student Travel Award.
- Second Prize, Shanghai Mathematical Model Competition.
- Academic Scholarships, Three Consecutive Years at Tongji University.

RESEARCH EXPERIENCE

Ph.D. Research: Large-Scale Optimization Algorithms *Aug.2022 – Present*
Advisor: Prof. Hongchang Gao

- **Stochastic Optimization Beyond Minimization:** *(Paper published; Tutorial)*
  - Investigating the convergence behavior of stochastic optimization algorithms beyond minimization, including minimax, compositional, bilevel, and multi-level problems.
  - Studying convergence acceleration techniques, such as moving-average momentum, variance reduction, and smoothing, while exploring the connection between loss landscape geometry and generalization to better understand optimization stability.
  - Applying the developed theoretical frameworks to diverse machine learning tasks, including deep AUC maximization, multi-instance learning, hyperparameter optimization, and model pruning tasks.
- **Large-Scale Distributed Optimization:** *(Paper published; Tutorial)*
  Co-Advisor: Prof. Richard Souvenir
  - Designing communication-efficient algorithms for federated learning, addressing heterogeneous data distributions across clients and providing provably convergent methods with improved computation and communication efficiency.
  - Developing optimization algorithms for decentralized learning over general network topologies, maintaining robustness to topology variations and demonstrating consistent convergence performance.
- **Optimization for Large Language Models:** *(Preprint)*
  - Exploring the convergence stability and robustness of the Muon optimizer for large-scale pretraining, investigating its behavior under heavy-tailed noise and in distributed training environments.
  - Investigating optimization algorithms for the post-training stage of large language models, including fine-tuning and knowledge distillation for efficient task-specific adaptation.

RESEARCH PUBLICATIONS

[**ICML 2026**] **Xinwen Zhang**, Richard Souvenir, Hongchang Gao. "LS^{2}MC-GDA: A Smoothed Algorithm for Federated Stochastic Multi-level Compositional Minimax Optimization." *In Proceedings of the 43rd International Conference on Machine Learning, 2026.*

[**ICML 2026**] **Xinwen Zhang**, Yihan Zhang, Hongchang Gao, Heng Huang. "Distributed Stochastic K-Level Optimization Over Networks." *In Proceedings of the 43rd International Conference on Machine Learning, 2026.*

[**ICML 2026**] Yihan Zhang, **Xinwen Zhang**, My T. Thai, Jie Wu, Hongchang Gao. "Convergence Analysis of Decentralized Hessian-/Jacobian-Free Algorithm for Nonconvex Stochastic Bilevel Optimization." *In Proceedings of the 43rd International Conference on Machine Learning, 2026.*

[**ToN 2026**] Jiyao Liu, **Xinwen Zhang**, Xinliang Wei, Xuanzhang Liu, Yuzhou Chen, Hongchang Gao, Yu Wang. "Swapping and Purification Scheme Optimization for Entanglement Distribution in Quantum Networks." *In IEEE Transactions on Networking, 2026.*

[**NeurIPS 2025**] **Xinwen Zhang**, Hongchang Gao. "On the Convergence of Stochastic Smoothed Multi-Level Compositional Gradient Descent Ascent." *In Proceedings of the 39th Conference on Neural Information Processing Systems, 2025.*

[**ICDM 2025**] **Xinwen Zhang**, Hongchang Gao. "Sharpness-Aware Optimization Through Variance Suppression on Deep AUC Maximization." *In IEEE International Conference on Data Mining, 2025.*

[**IWQoS 2025**] Jiyao Liu, **Xinwen Zhang**, Xinliang Wei, Xuanzhang Liu, Yuzhou Chen, Hongchang Gao, Yu Wang. "Joint Swapping and Purification with Failures for Entanglement Distribution in Quantum Networks." *In IEEE/ACM 33rd International Symposium on Quality of Service, 2025.*

[**ICML 2024**] **Xinwen Zhang**, Ali Payani, Myungjin Lee, Richard Souvenir, Hongchang Gao. "A Federated Stochastic Multi-Level Compositional Minimax Algorithm for Deep AUC Maximization." *In Proceedings of the 41st International Conference on Machine Learning, 2024.*

[**NeurIPS 2023**] **Xinwen Zhang**, Yihan Zhang, Tianbao Yang, Richard Souvenir, Hongchang Gao. "Federated Compositional Deep AUC Maximization." *In Proceedings of the 37th Conference on Neural Information Processing Systems, 2023.*

Preprints

[**arXiv 2025**] **Xinwen Zhang**, Yihan Zhang, Hongchang Gao. "Nonconvex Decentralized Stochastic Bilevel Optimization under Heavy-Tailed Noises." *arXiv preprint arXiv:2509.15543.*

[**arXiv 2025**] **Xinwen Zhang**, Hongchang Gao. "On Provable Benefits of Muon in Federated Learning." *arXiv preprint arXiv:2510.03866.*

[**arXiv 2025**] **Xinwen Zhang**, Hongchang Gao. "Federated Stochastic Minimax Optimization under Heavy-Tailed Noises." *arXiv preprint arXiv:2511.04456.*

TUTORIALS & WORKSHOPS

[**ICDM'25 Tutorial**] Hongchang Gao, **Xinwen Zhang**. "Federated Stochastic Compositional and Bilevel Optimization." *In the 2025 IEEE International Conference on Data Mining.*

[**IJCAI'25 Tutorial**] Hongchang Gao, **Xinwen Zhang**. "Federated Stochastic Compositional and Bilevel Optimization." *In Proceedings of the 34th International Joint Conference on Artificial Intelligence, 2025.*

[**WiML'23 Workshop**] **Xinwen Zhang**, Richard Souvenir, Hongchang Gao. "A Fast Federated Stochastic Compositional Minimax Optimization Algorithm with Variance Reduction." *18th Women in Machine Learning Workshop, 2023.*

[**KDD'23 Tutorial**] Hongchang Gao, **Xinwen Zhang**. "Distributed Optimization for Big Data Analytics: Beyond Minimization." *In Proceedings of the 27th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, 2023.*

WORK EXPERIENCE

Teaching Assistant at Temple University *Philadelphia, Aug.2022 – Dec.2024*

- CIS3715 Principles of Data Science (Spring 2023, Spring 2024)
- CIS1051 Introduction to Problem Solving and Programming in Python (Fall 2022, Spring 2023, Fall 2023, Spring 2024, Fall 2024)

Data Analysis Intern at Zhongyuan Consumer Finance *Shanghai, Mar.2021 – Jun.2021*

- Developed Python and SQL pipelines for automated credit monitoring and risk assessment, and built user profiling models from multi-source behavioral data to support targeted marketing strategies.
- Modeled behavioral patterns across advertising schedules and time periods to automate and improve the credit evaluation process.
- Conducted multivariate statistical analysis on user engagement data from a festival campaign, demonstrating that cash incentive activities significantly improved customer retention.

PROFESSIONAL SERVICE

- **Conference Reviewer:**
  - 2026: AAAI, ICML, NeurIPS, KDD, ICLR, AISTATS.
  - 2025: AAAI, ICML, NeurIPS, KDD, ICLR, AISTATS.
  - 2024: AAAI, ICML, NeurIPS.
- **Journal Reviewer:** Journal of Combinatorial Optimization, Neural Networks, Journal of Optimization Theory and Applications.