# Wenzhi Gao

123 Campus Dr, Stanford, CA 94305 gwz@stanford.edu
Website | Google Scholar | CV PDF

## Summary

Third-year Ph.D. student in ICME at Stanford University specializing in large-scale numerical optimization and online decision-making. Experienced in designing efficient algorithms and implementing scalable optimization software.

## Research Interests

Large-scale numerical optimization; sequential decision-making and online convex optimization; stochastic first-order methods.

## Education

**Ph.D. Student, ICME**, Stanford University (GPA: 4.0/4.0) Sep 2023 – Present
- Advisor: Prof. Madeleine Udell
- Relevant coursework: optimization theory; statistical learning theory.

**Master of Management**, Shanghai University of Finance and Economics (GPA: 3.8/4.0) Sep 2021 – Jul 2023
- Major: Management Science and Engineering
- Advisors: Prof. Dongdong Ge and Prof. Yinyu Ye
- Thesis title: *HDSDP: Software for Semidefinite Programming*
- Relevant coursework: management science; applied mathematics; statistics; financial engineering.

**Bachelor of Science**, Shanghai University of Finance and Economics (GPA: 3.8/4.0) Sep 2017 – Jul 2021
- Major: Information Management and Information Systems
- Advisor: Prof. Qi Deng
- Thesis title: *Randomized Iterative-Solver Based Inexact Infeasible Path-following IPM for Low-rank Convex QP*
- Relevant coursework: management science; applied mathematics; statistics.

## Research and Working Experience

**Research Assistant**, Stanford University Sep 2024 – Present
- Develop improved complexity guarantees for large-scale numerical optimization.
- Design algorithms for online resource allocation and online convex optimization.
- Contribute theory and practice for hypergradient-based learning-rate adaptation (see Publications).
- Build an LLM-based agent system for optimization modeling.

**Optimization Solver Developer Intern**, Cardinal Operations May 2020 – May 2023
- Accelerated real-world applications via problem-specific heuristics and data preprocessing.
- Developed numerical optimization software HDSDP for semidefinite programming in COPT (Cardinal Optimizer).

**Research Assistant**, Shanghai University of Finance and Economics Jan 2020 – May 2023
- Participated in international research projects in numerical optimization, mathematical optimization, and distributed optimization.

## Publications

**Highlighted Publications**

1. **Gradient Methods with Online Scaling**
   **Wenzhi Gao**, Ya-Chi Chu, Yinyu Ye, and Madeleine Udell. COLT 2025.

2. **Provable and Practical Online Learning Rate Adaptation with Hypergradient Descent**
   Ya-Chi Chu, **Wenzhi Gao**, Yinyu Ye, and Madeleine Udell. ICML 2025.
3. **Gradient Methods with Online Scaling. Part I. Theoretical Foundations**
   **Wenzhi Gao**, Ya-Chi Chu, Yinyu Ye, and Madeleine Udell. Under review, 2025.
4. **Gradient Methods with Online Scaling. Part II. Practical Aspects**
   Ya-Chi Chu, **Wenzhi Gao**, Yinyu Ye, and Madeleine Udell. Under review, 2025.

   *This series of papers establishes a new mechanism for online learning algorithms to accelerate first-order methods. It also provides the first theoretical analysis of hypergradient descent, a long-standing optimization technique in machine learning.*
5. **Beyond $\mathcal{O}(\sqrt{T})$ Regret: Decoupling Learning and Decision-Making in Online Linear Programming**
   **Wenzhi Gao**, Dongdong Ge, Chunlin Sun, Chenyu Xue, and Yinyu Ye. Operations Research, 2026.

   *Proposes a general framework that allows efficient first-order methods in online resource allocation to reach state-of-the-art performance guarantees.*

**Other Accepted Papers**

6. **Scalable Approximate Optimal Diagonal Preconditioning**
   **Wenzhi Gao**, Zhaonan Qu, Madeleine Udell, and Yinyu Ye. *Computational Optimization and Applications*, 2026.
7. **On Sinkhorn's Algorithm and Choice Modeling**
   Zhaonan Qu, Alfred Galichon, **Wenzhi Gao**, and Johan Ugander. *Operations Research*, 2025.
8. **Wait-Less Offline Tuning and Re-solving for Online Decision Making**
   Jingruo Sun, **Wenzhi Gao**, Ellen Vitercik, and Yinyu Ye. ICML 2025.
9. **HDSDP: Software for Semidefinite Programming**
   **Wenzhi Gao**, Dongdong Ge, and Yinyu Ye. *ACM Transactions on Mathematical Software*, 2025.
10. **Decoupling Learning and Decision-Making: Breaking the $\mathcal{O}(\sqrt{T})$ Barrier in Online Resource Allocation with First-order Methods**
    **Wenzhi Gao**, Chunlin Sun, Chenyu Xue, and Yinyu Ye. ICML 2024.
11. **Stochastic Weakly Convex Optimization beyond Lipschitz Continuity**
    **Wenzhi Gao** and Qi Deng. ICML 2024.
12. **OptiMUS: Scalable Optimization Modeling with (MI) LP Solvers and Large Language Models**
    Ali AhmadiTeshnizi, **Wenzhi Gao**, and Madeleine Udell. ICML 2024.
13. **An Enhanced Alternating Direction Method of Multipliers-based Interior Point Method for Linear and Conic Optimization**
    Qi Deng, Qing Feng, **Wenzhi Gao**, *et al. INFORMS Journal on Computing*, 2024.
14. **Optimal Diagonal Preconditioning: Theory and Practice**
    Zhaonan Qu, **Wenzhi Gao**, Oliver Hinder, Yinyu Ye, and Zhengyuan Zhou. *Operations Research*, 2024.
15. **Delayed Algorithms for Distributed Stochastic Weakly Convex Optimization**
    **Wenzhi Gao** and Qi Deng. NeurIPS 2023.
16. **Solving Linear Programs with Fast Online Learning Algorithms**
    **Wenzhi Gao**, Dongdong Ge, Chunlin Sun, and Yinyu Ye. ICML 2023.
17. **Minibatch and Momentum Model-based Methods for Stochastic Weakly Convex Optimization**
    Qi Deng and **Wenzhi Gao**. NeurIPS 2021.

**Preprints under Review**

18. **Small Gradient Norm Regret for Online Convex Optimization**
    **Wenzhi Gao**, Chang He, and Madeleine Udell. Under review, 2026.
19. **A Smooth Approximation Framework for Weakly Convex Optimization**
    Qi Deng and **Wenzhi Gao**. Under review, 2025.
20. **New Results on the Polyak Stepsize: Tight Convergence Analysis and Universal Function Classes**
    Chang He, **Wenzhi Gao**, Bo Jiang, Madeleine Udell, and Shuzhong Zhang. Under review, 2025.
21. **When Does Primal Interior Point Method Beat Primal-dual in Linear Optimization?**
    **Wenzhi Gao**, Huikang Liu, Yinyu Ye, and Madeleine Udell. Preprint, 2024.
22. **OptiMUS-0.3: Using Large Language Models to Model and Solve Optimization Problems at Scale**
    Ali AhmadiTeshnizi, **Wenzhi Gao**, Herman Brunborg, Shayan Talaei, and Madeleine Udell. Major revision at *Management Science*, 2024.
23. **Data-driven Mixed Integer Optimization through Probabilistic Multi-variable Branching**

Yanguang Chen, **Wenzhi Gao**, Wanyu Zhang, Dongdong Ge, Huikang Liu, and Yinyu Ye. Under review, 2023.

## Awards

- Outstanding Graduate Dissertation Award, SHUFE (2022–2023).
- National Graduate Scholarship in China (1/50) (2022–2023).
- NeurIPS Travel Award (2023).
- The Enlight Foundation Graduate Fellowship (2023–2024).

## Academic Service

- Journal reviewer: *Management Science*; *Operations Research*; *TMLR*; *AJCN*; *JORS*.
- Conference reviewer: NeurIPS (2023–2025); ICLR (2023–2026); ICML (2024–2026; top reviewer 2025); AAAI (2024–2026); AISTATS (2025–2026); KDD (2024); NLDL (2025).
- Session (co-)chair: INFORMS Annual Meeting 2024 (Seattle, WA).

## Talks

- *When Does Primal/Dual IPM Beat Primal-dual?* IOS 2026 (Atlanta, GA); INFORMS Annual Meeting 2024 (Seattle, WA); MOPTA 2024 (Lehigh University).
- *Gradient Methods with Online Scaling* INFORMS Annual Meeting 2025 (Atlanta, GA); ICCOPT 2025 (Los Angeles, CA).
- *Beyond $\mathcal{O}(\sqrt{T})$ regret: decoupling learning and decision-making in online linear programming* INFORMS Annual Meeting 2025 (Atlanta, GA).
- *Optimal diagonal preconditioning* ICCOPT 2025 (Los Angeles, CA).

## Skills

- **Programming:** Python, MATLAB, C.
- **Optimization tools:** Gurobi, CPLEX, COPT, MOSEK, SCIP.