

Zikai Xiong

MIT Operations Research Center
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EDUCATION

Massachusetts Institute of Technology, Cambridge, MA	(expected) June 2025
Ph.D. in Operations Research	
GPA: 5.0/5.0	
Advisor: Prof. Robert M. Freund	
Fudan University, Shanghai, China	May 2020
B.S. in Mathematics and Applied Mathematics	

RESEARCH INTERESTS

Huge-scale linear programming, first-order methods for optimization, with applications in statistical learning, machine learning, deep learning, transportation, and fairness.

PUBLICATIONS

Publications and working papers in optimization:

- **Zikai Xiong** and Robert Freund, “Level-Set Geometry, Complexity, and Improving Restarted-PDHG for Conic LP,” to be submitted to *Operations Research*. (Job Market Paper)
- **Zikai Xiong** and Robert Freund, “Computational Guarantees for Restarted PDHG for LP based on ‘Limiting Error Ratios’ and LP Sharpness,” under review in *Mathematical Programming*.
- **Zikai Xiong** and Robert Freund, “On the Relation Between LP Sharpness and Limiting Error Ratio in Linear Programs and the Complexity Implication of the Restarted PDHG,” *technical report*.
- **Zikai Xiong**, Niccolo Dalmasso, Vamsi Potluru, Tucker Balch, Manuela Veloso, “Fair Wasserstein Coresets,” oral presentation at *NeurIPS 2023 workshop*, under review in *ICML 2024*.
- **Zikai Xiong**, Niccolo Dalmasso, Alan Mishler, Vamsi Potluru, Tucker Balch, Manuela Veloso, “FairWASP: Fast and Optimal Fair Wasserstein Pre-processing,” to appear in *AAAI 2024*.
- **Zikai Xiong** and Robert Freund, “Using Taylor-Approximated Gradients to Improve the Frank-Wolfe Method for Empirical Risk Minimization,” accepted by *SIAM Journal on Optimization*.
- (Alphabetical order) Dongdong Ge, Chengwenjian Wang, **Zikai Xiong**, and Yinyu Ye, “From an Interior Point to a Corner Point: Smart Crossover,” major revision in *INFORMS Journal on Computing*.
- (Alphabetical order) Dongdong Ge, Haoyue Wang, **Zikai Xiong**, and Yinyu Ye, “Interior-Point Methods Strike Back: Solving the Wasserstein Barycenter Problem.” *NeurIPS 2019*, 6894-6905, 2019.
- **Zikai Xiong**, Renjie Xu, Yanwei Xu, and Yimin Wei, “Low-Rank Traffic Matrix Completion with Marginal Information.” *Journal of Computational and Applied Mathematics* 410(3):114219, 2022.

Other:

- Zhengqi Gao, Fan-Keng Sun, Mingran Yang, Sucheng Ren, **Zikai Xiong**, et al. “Learning from Multiple Annotator Noisy Labels via Sample-wise Label Fusion.” *ECCV 2022*.

WORK EXPERIENCE

Research Intern, J.P.Morgan Chase AI Research

2023 Summer

- Developed a preprocessing method on datasets to improve fairness for downstream models, via proposing a fast algorithm on the huge-scale linear programming subproblem
- Developed a data distillation algorithm that distills the knowledge of large models and ensures the fairness for downstream models

Research Assistant, Shanghai University of Finance and Economics (SUFU)

2018 - 2022

Research Institute for Interdisciplinary Sciences (RIIS)

Supervisors: Yinyu Ye (Stanford), Dongdong Ge (SUFU)

- Developed new crossover methods for linear programming (LP), now in a new commercial LP solver that won first place in Hans Mittelmann benchmark of barrier LP solvers.
- Developed a matrix-based interior-point method to solve the large-scale linear programming problems in Wasserstein barycenter problems.

PRESENTATIONS

- “Improving the Geometry of (Conic) Linear Optimization Problems for the Primal-Dual Hybrid Gradient Method (PDHG),” Workshop on Modern Continuous Optimization, Cambridge, 2023; INFORMS Annual Meeting, Phoenix, 2023; SUFE, Shanghai, 2023; INFORMS Optimization Society Conference, Houston, 2024
- “Geometric Condition Measures in the Primal-Dual Hybrid Gradient Method for Linear Programming,” SIAM Conference on Optimization (OP23), Seattle, 2023; MIT Operations Research Center, Cambridge, 2023; SUFE, Shanghai, 2023
- “Using Taylor-Approximated Gradients to Improve the Frank-Wolfe Method for Empirical Risk Minimization,” ICCOPT, Bethlehem, 2022; and MIT Operations Research Center, Cambridge, 2022; INFORMS Annual Meeting, Indianapolis, 2022
- “From an inner point to a corner point: Smart Crossover,” INFORMS Annual Meeting, Indianapolis, 2022
- “Interior-Point Methods Strike Back: Solving the Wasserstein Barycenter Problem,” INFORMS Annual Meeting, Seattle, 2019; SUFE, 2019

PROFESSIONAL SERVICE

Reviewer:

Journal: *SIAM Journal on Optimization (SIOPT)*

Conference: *ICML 2021/2022; NeurIPS 2022*

HONORS & AWARDS

Informs Optimization Society Conference Travel Award

2024

First Place, MIT OR Center Common Experience Presentation Competition

SIAM Travel Award

2021

Fudan Graduation Star	2020
The highest award of Fudan University, for only 10 graduates every year	
Outstanding Graduate of Shanghai City	2020
Fudan Outstanding Student Pacesetter Award	2019
The highest annual award of Fudan University, for only 10 undergraduate students	
National Scholarship	2018
The highest annual scholarship for top students (1%)	

OTHER

Teaching Assistant:

Massachusetts Institute of Technology graduate courses:

- 15.081 Introduction to Mathematical Programming Fall 2023
- 15.081 Introduction to Mathematical Programming Fall 2022
- 15.077 Statistical Machine Learning and Data Science Summer 2022
- 15.071 The Analytics Edge Spring 2022

Shanghai University of Finance and Economics graduate courses:

- International Summer Courses (Stochastic Modeling; From Machine Learning to Decision-making: Bandit Learning and Reinforcement Learning; Stochastic Process and Financial Risk Analysis) Summer 2019

Programming languages: Julia, Python, MATLAB, R, C++

Hobbies: Hiking, Kayaking, Skiing