

Tianjiao Li

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RESEARCH INTERESTS

My research focuses on the design and analysis of novel first-order methods for *Nonlinear Optimization*, *Stochastic Optimization*, and *Dynamic Decision-Making*. I also actively pursue the practical value of these methods in relevant applications. I am particularly interested in

- (i) Parameter-free methods for convex and nonconvex optimization
- (ii) Stochastic optimization for statistical and machine learning
- (iii) Policy optimization and policy evaluation in reinforcement learning
- (iv) Applications, e.g., healthcare, E-commerce, finance

ACADEMIC POSITIONS

Aug 2025 - present **MIT Sloan School of Management**, Cambridge, MA, USA
Postdoctoral Associate & Lecturer
- Supervisor: Swati Gupta
- Instructor of 15.081/6.7210 (Introduction to Mathematical Programming)

EDUCATION

Aug 2020 - Aug 2025 **Georgia Institute of Technology**, Atlanta, GA, USA
Ph.D. in Operations Research (Minor in Machine Learning)
- Advisor: Guanghui (George) Lan
- Co-advisor: Ashwin Pananjady
- Dissertation: New Accelerated Methods for Optimization and Reinforcement Learning

Aug 2019 - May 2021 **Georgia Institute of Technology**, Atlanta, GA, USA
M.S. in Quantitative and Computational Finance

Sep 2015 - Jun 2019 **Fudan University**, Shanghai, China
B.S. in Information and Computational Science

PUBLICATIONS

(α - β = alphabetical order)

- **A Simple Uniformly Optimal Method without Line Search for Convex Optimization**
Tianjiao Li, Guanghui Lan
Mathematical Programming Series A, 2025
- Second Place, INFORMS Optimization Society Student Paper Prize, 2025
- Winner, Alice and John Jarvis Best Student Paper Award, 2024
- **Accelerated Stochastic Approximation with State-Dependent Noise**
Sasila Ilandarideva, Anatoli Juditsky, Guanghui Lan, Tianjiao Li (α - β)
Mathematical Programming Series A, 2024
- **Stochastic First-Order Methods for Average-Reward Markov Decision Processes**
Tianjiao Li, Feiyang Wu, Guanghui Lan
Mathematics of Operations Research, 2024

- **Faster Algorithm and Sharper Analysis for Constrained Markov Decision Process**
Tianjiao Li, Ziwei Guan, Shaofeng Zou, Tengyu Xu, Yingbin Liang, Guanghui Lan
Operations Research Letters, vol. 54, 107107, 2024
- **Accelerated and Instance-Optimal Policy Evaluation with Linear Function Approximation**
Tianjiao Li, Guanghui Lan, Ashwin Pananjady
SIAM Journal on Mathematics of Data Science, vol. 5, no. 1, pp. 174-200, 2023
- **Simple and Optimal Methods for Stochastic Variational Inequalities, I: Operator Extrapolation**
Georgios Kotsalis, Guanghui Lan, Tianjiao Li (α - β)
SIAM Journal on Optimization, vol. 32, no. 3, pp. 2041-2073, 2022
- **Simple and Optimal Methods for Stochastic Variational Inequalities, II: Markovian Noise and Policy Evaluation in Reinforcement Learning**
Georgios Kotsalis, Guanghui Lan, Tianjiao Li (α - β)
SIAM Journal on Optimization, vol. 32, no. 2, pp. 1120-1155, 2022

PREPRINTS AND WORKING PAPERS

- **Projected Gradient Methods for Nonconvex and Stochastic Optimization: New Complexities and Auto-Conditioned Stepsizes**
Guanghui Lan, Tianjiao Li, Yangyang Xu (α - β)
Major revision, *Mathematical Programming Series A*. Initial version submitted in Dec 2024.
- **Auto-Conditioned Primal-Dual Hybrid Gradient Method and Alternating Direction Method of Multipliers**
Guanghui Lan, Tianjiao Li (α - β)
Preprint at arXiv:2410.01979.
- **Novel Accuracy Certificates for Smooth Convex Optimization**
Sasila Ilendarideva, Anatoli Juditsky, Guanghui Lan, Tianjiao Li (α - β)
In preparation.
- **Multiscale Replay: A Robust Algorithm for Stochastic Variational Inequalities with a Markovian Buffer**
Milind Nakul, Tianjiao Li, Ashwin Pananjady
In preparation.

AWARDS AND HONORS

- **Second Place, INFORMS Optimization Society Student Paper Prize, 2025**
- **Alice and John Jarvis Best Student Paper Award, 2024**
- Awarded annually to one Ph.D. student in ISyE across all disciplines
- **Second Place, Poster Competition, YinzOR Student Conference 2024**
- **Shabbir Ahmed PhD Fellowship for Excellence in Research, 2023**
- Awarded annually to one Ph.D. student in ISyE for research in optimization
- **First Place, Best Poster Award, Georgia Statistics Day 2023**

INDUSTRIAL EXPERIENCE

May 2023 - Amazon, Seattle, WA, USA

Aug 2023 Position: Applied Scientist Intern

- Developed an automated seasonality detection and seasonal-trend decomposition module for Amazon Payment anomaly detection platform
- The internal paper was accepted by 2023 Amazon Machine Learning Conference (AMLC)

VISITING EXPERIENCE

- Apr 2024 - Laboratoire Jean Kuntzmann, University Grenoble Alpes, Grenoble, France**
May 2024 Visiting Graduate Student
- Host: Anatoli Juditsky
- Project: Stochastic Optimization Algorithms for Machine Learning Applications
- Oct 2021 - Simons Institute for the Theory of Computing, UC Berkeley, Berkeley, CA**
Nov 2021 Visiting Graduate Student
- Host: Ashwin Pananjady
- Program: Computational Complexity of Statistical Inference

RESEARCH COLLABORATION

- Nov 2023 - University of Louisville Health and Hospital**
Present Project: reinforcement learning method for clinical decision making within surgical operations
- Realtime intra- and post-operative clinical recommendation for prevention and mitigation of cardiac surgery-associated acute kidney injury (CSA-AKI)
- Realtime intra-operative treatment recommendation for management of hypotension during surgeries
- Oct 2022 - AI Institute for Advances in Optimization (AI4OPT)**
May 2023 Project: AI4OPT collaboration with Intel Corporation
- Implemented the factorial model and random forest to detect significant factors in a process control problem (targeting at reducing the variability of a time series) with limited and highly skewed data

TEACHING AND STUDENT MENTORING

- **Course Instructor, MIT, Fall 2025**
Introduction to Mathematical Programming (15.081J)
- Description: MIT's doctoral introductory optimization course for ORC and other MIT PhD programs
- **Course Instructor, Georgia Tech, Summer 2024**
Statistics and Applications (ISyE 3770)
- Description: one-semester probability and statistics course for engineering students
- Class size: **64** (26 on campus + 38 online)
- Overall teaching evaluation: **4.8/5.0** (response rate: 56%)
- **Guest Lecturer, Georgia Tech, Fall 2024**
Computational Data Analysis / Machine Learning (ISyE 6740)
- Description: general machine learning course for master and Ph.D. students
- Instructor: Guanghui (George) Lan
- Responsibility: 2 Lectures in machine learning and data science
- **Guest Lecturer, Georgia Tech, Spring 2024**
Optimization Methods for Reinforcement Learning (ISyE 8803)
- Description: advanced topic in optimization for RL for ISyE Ph.D. students
- Instructor: Guanghui (George) Lan
- Responsibility: 8 Lectures in policy evaluation and average-reward MDPs
- **Student Mentoring:**
 - Milind Nakul, ISyE PhD Student, Georgia Tech
Research project: Experience replay for policy evaluation in reinforcement learning
 - Feiyang Wu, CS Master Student, Georgia Tech
Research project: Stochastic first-order methods for average-reward MDPs
 - ISyE PhD mentoring program, Georgia Tech

TALKS AND PRESENTATIONS

- **Universal Parameter-Free Methods for Convex, Nonconvex, and Stochastic Optimization**
 - ORIE Colloquium, Cornell University, Ithaca, NY, Feb 2025
 - STOR Colloquium, UNC Chapel Hill, Chapel Hill, NC, Jan 2025
 - IMS Young Mathematical Scientists Forum (Applied Mathematics), Singapore, Jan 2025
- **Accelerated Stochastic Approximation with State-Dependent Noise**
 - International Conference on Continuous Optimization (ICCOPT 2025), Los Angeles, CA, Jul 2025
 - YinzOR Student Conference (Poster), CMU Tepper School of Business, Pittsburgh, PA, Aug 2024
 - SIAM Conference on Optimization, Seattle, WA, May 2023
- **A Simple Uniformly Optimal Method without Line Search for Convex Optimization**
 - INFORMS Annual Meeting, Seattle, WA, Oct 2024
 - Cornell ORIE Young Researchers Workshop, Ithaca, NY, Oct 2024
 - International Symposium on Mathematical Programming (ISMP 2024), Montreal, Canada, Jul 2024
 - DAO Team Seminar at Laboratoire Jean Kuntzmann, Grenoble, France, May 2024
 - INFORMS Optimization Society Conference, Houston, TX, Mar 2024
- **Accelerated and Instance-Optimal Policy Evaluation with Linear Function Approximation**
 - INFORMS Annual Meeting, Phoenix, AZ, Oct 2023
 - Georgia Statistics Day (Poster), Atlanta, GA, Oct 2023
- **Stochastic First-Order Methods for Average-Reward Markov Decision Processes**
 - INFORMS Annual Meeting, Indianapolis, IN, Oct 2022
 - ISyE Ph.D. Student Seminar, Atlanta, GA, Sep 2022
- **Faster Algorithm and Sharper Analysis for Constrained Markov Decision Process**
 - Asilomar Conference on Signals, Systems, and Computers, Online, Nov 2021
- **Simple and Optimal Methods for Stochastic Variational Inequalities**
 - INFORMS Annual Meeting, Online, Oct 2021

SERVICES

- **Journal Reviewing:**
 - SIAM Journal on Optimization
 - Mathematical Programming
 - Annals of Statistics
 - Computational Optimization and Applications
 - Journal of Optimization Theory and Applications
 - Journal of Global Optimization
 - Optimization Letters
 - Operations Research Letters
 - IEEE Transactions on Automatic Control
- **Conference Reviewing:**
 - Conference on Learning Theory (COLT) 2022-2025
- **Session Organization:**
 - **International Conference on Continuous Optimization (ICCOPT 2025)**, Los Angeles, CA, Jul 2025
Session: Recent Advances in Stochastic First-Order Methods
 - **INFORMS Annual Meeting 2024**, Seattle, WA, Oct 2024
Session: Advances in Continuous Optimization Algorithms
Session: Advances in Non-Smooth Optimization
 - **International Symposium on Mathematical Programming (ISMP 2024)**, Montreal, Canada, Jul 2024
Session: Advances in First-Order Methods for Stochastic and Continuous Optimization