

Tianjiao Li

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RESEARCH INTERESTS

My research interests lie in the theory and methodology of *Nonlinear Optimization*, *Stochastic Optimization*, and *Dynamic Decision-Making*, with a central focus on bridging rigorous theoretical development with practical relevance, especially in data science and artificial intelligence. I am particularly interested in

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

ACADEMIC POSITIONS

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

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
- Finalist (winner to be announced), George Nicholson Student Paper Competition, 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
- Second Place, CMU YinzOR Poster Competition, 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
- Winner, Georgia Statistics Day Best Poster Award, 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. To be submitted to *SIAM Journal on Optimization*.
- **Multiscale Replay: A Robust Algorithm for Stochastic Variational Inequalities with a Markovian Buffer**
Milind Nakul, Tianjiao Li, Ashwin Pananjady
In preparation.
- **Novel Accuracy Certificates for Smooth Convex Optimization**
Sasila Ilandarideva, Anatoli Juditsky, Guanghui Lan, Tianjiao Li (α - β)
In preparation.

AWARDS AND HONORS

- **Finalist (winner to be announced), George Nicholson Student Paper Competition, 2025**
- **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 Georgia Tech 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 Georgia Tech ISyE for research in optimization
- **First Place, Best Poster Award, Georgia Statistics Day, 2023**

TEACHING AND STUDENT MENTORING

- **Course Instructor, MIT, Fall 2025**
Introduction to Mathematical Programming (15.081/6.7210)
 - Description: MIT's doctoral-level linear optimization course for ORC and other MIT PhD programs
 - Class size: **49** (43 students + 6 listeners)
- **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

INDUSTRIAL EXPERIENCE

- May 2023 - Amazon, Seattle, WA, USA**
- Aug 2023** Position: Applied Scientist Intern
- Anomaly detection research for the Amazon Payment 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

TALKS AND PRESENTATIONS

■ A Simple Uniformly Optimal Method without Line Search for Convex Optimization

- (Upcoming) INFORMS Annual Meeting, Atlanta, GA, Oct 2025

Presentation I: Optimization Society Award Session II, Oct 26 (Sunday), 2:45 PM - 4:00 PM

Presentation II: George Nicholson Student Paper Competition, Oct 26 (Sunday), 4:15 PM - 5:30 PM

- 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 Stochastic Approximation with State-Dependent Noise

- (Upcoming) INFORMS Annual Meeting, Atlanta, GA, Oct 2025

Session: Recent Advances in Stochastic and Nonlinear Optimization, Oct 28 (Tuesday), 11:00 AM - 12:15 PM

- 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

■ 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 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

- Annuals 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

REFERENCES

- **Guanghui (George) Lan (Professor)**
H. Milton Stewart School of Industrial and Systems Engineering, Georgia Tech
Email: george.lan@isye.gatech.edu
- **Ashwin Pananjady (Assistant Professor)**
H. Milton Stewart School of Industrial and Systems Engineering
& School of Electrical and Computer Engineering, Georgia Tech
Email: ashwinpm@gatech.edu
- **Arkadi Nemirovski (Professor)**
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- **Anatoli Juditsky (Professor)**
Laboratoire Jean Kuntzmann, University Grenoble Alpes
Email: anatoli.juditsky@univ-grenoble-alpes.fr
- **Swati Gupta (Associate Professor)**
Sloan School of Management, MIT
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