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, 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.

- **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

- **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 - Aug 2023 **Amazon**, Seattle, WA, USA
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 - May 2024 **Laboratoire Jean Kuntzmann, University Grenoble Alpes**, Grenoble, France
Visiting Graduate Student
- Host: Anatoli Juditsky
- Project: Stochastic Optimization Algorithms for Machine Learning Applications

Oct 2021 - Nov 2021 **Simons Institute for the Theory of Computing, UC Berkeley**, Berkeley, CA
Visiting Graduate Student
- Host: Ashwin Pananjady
- Program: Computational Complexity of Statistical Inference

RESEARCH COLLABORATION

Nov 2023 - Present **University of Louisville Health and Hospital**

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 - May 2023 **AI Institute for Advances in Optimization (AI4OPT)**

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

- **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**
  - INFORMS Annual Meeting, Atlanta, GA, Oct 2025 (Upcoming)
  - International Conference on Continuous Optimization (ICCOPT 2025), Los Angeles, CA, Jul 2025
  - YinzOR Student Conference (Poster), CMU Tepper School of Business, Pittsburg, 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
  - 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