

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

EDUCATION

Aug 2020 - Georgia Institute of Technology, Atlanta, GA, USA
Jun 2025 (expected) Ph.D. in Operations Research
- Advisor: Guanghui (George) Lan
- Co-advisor: Ashwin Pananjady
- Minor: Machine Learning
- Department: H. Milton Stewart School of Industrial and Systems Engineering
Aug 2019 - Georgia Institute of Technology, Atlanta, GA, USA
May 2021 M.S. in Quantitative and Computational Finance
Sep 2015 - Fudan University, Shanghai, China
Jun 2019 B.S. in Information and Computational Science
- Department: School of Mathematical Sciences

PUBLICATIONS

(α - β =alphabetical order)

- **A Simple Uniformly Optimal Method without Line Search for Convex Optimization**
Tianjiao Li, Guanghui Lan
Under second-round review, *Mathematical Programming Series A*. Initial version submitted in Oct 2023.
(Winner of 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)
Preprint at arXiv:2412.14291. Submitted to *Mathematical Programming Series A* 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*.
- **Novel Accuracy Certificates for Smooth Convex Optimization**
Sasila Ilandarideva, Anatoli Juditsky, Guanghui Lan, **Tianjiao Li** (α - β)
In preparation. 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. To be submitted to *Mathematics of Operations Research*.

AWARDS AND HONORS

- **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**
- **Fudan University School of Mathematical Sciences Academic Scholarship**

TEACHING AND STUDENT MENTORING

- **Course Instructor, Summer 2024, Georgia Tech 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%)
 - * Respect for students: **4.8/5.0**
 - * Inclusiveness: **4.9/5.0**
 - * Communicated how to succeed: **4.7/5.0**
 - * Availability: **4.9/5.0**
 - * Stimulates interest: **4.6/5.0**
 - * Clarity: **4.5/5.0**
 - * Feedback helpfulness: **4.8/5.0**

- **Guest Lecturer, Fall 2024, Georgia Tech**
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, Spring 2024, Georgia Tech**
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

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

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)

SERVICES

- **Journal Reviewing:**
 - SIAM Journal on Optimization
 - Mathematical Programming
 - Annals of Statistics
 - Computational Optimization and Applications
 - Optimization Letters
- **Conference Reviewing:**
 - Conference on Learning Theory (COLT) 2022-2024
- **Session Organization:**
 - **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

TALKS AND PRESENTATIONS

- **INFORMS Annual Meeting**, Seattle, WA, Oct 2024
 - Session: First-Order Methods in Continuous and Stochastic Optimization
 - Title: A Simple Uniformly Optimal Method without Line Search for Convex Optimization
- **Cornell ORIE Young Researchers Workshop**, Ithaca, NY, Oct 2024
 - Session: Optimization I
 - Title: A Simple Uniformly Optimal Method without Line Search for Convex Optimization
- **YinzOR Student Conference, CMU Tepper School of Business**, Pittsburg, PA, Aug 2024
 - Poster presentation: Accelerated Stochastic Approximation with State-Dependent Noise
 - Won the Second Place in the poster competition
- **International Symposium on Mathematical Programming (ISMP 2024)**, Montreal, Canada, Jul 2024
 - Session: Advances in Stochastic First-Order Methods
 - Title: A Simple Uniformly Optimal Method without Line Search for Convex Optimization
- **DAO Team Seminar at Laboratoire Jean Kuntzmann**, Grenoble, France, May 2024
 - Title: A Simple Uniformly Optimal Method without Line Search for Convex Optimization
- **INFORMS Optimization Society Conference**, Houston, TX, Mar 2024
 - Session: Advances in Continuous Optimization Algorithms
 - Title: A Simple Uniformly Optimal Method without Line Search for Convex Optimization
- **INFORMS Annual Meeting**, Phoenix, AZ, Oct 2023
 - Session: Recent Advances in Policy Optimization and Reinforcement Learning
 - Title: Accelerated and Instance-Optimal Policy Evaluation with Linear Function Approximation
- **Georgia Statistics Day**, Atlanta, GA, Oct 2023
 - Poster presentation: Accelerated and Instance-Optimal Policy Evaluation with Linear Function Approximation
 - Won the First Place in the poster competition
- **SIAM Conference on Optimization**, Seattle, WA, May 2023
 - Session: New Sparse Optimization
 - Title: Accelerated Stochastic Approximation with State-Dependent Noise
- **INFORMS Annual Meeting**, Indianapolis, IN, Oct 2022
 - Session: Reinforcement Learning Theory
 - Title: Stochastic First-Order Methods for Average-Reward Markov Decision Processes
- **ISyE Ph.D. Student Seminar**, Atlanta, GA, Sep 2022

- Title: Stochastic First-Order Methods for Average-Reward Markov Decision Processes
- **Asilomar Conference on Signals, Systems, and Computers**, Online, Nov 2021
 - Session: Theory of Reinforcement Learning
 - Title: Faster Algorithm and Sharper Analysis for Constrained Markov Decision Process
- **INFORMS Annual Meeting**, Online, Oct 2021
 - Session: Stochastic Optimization in Machine Learning
 - Title: Simple and Optimal Methods for Stochastic Variational Inequalities

REFERENCES

- **Guanghui (George) Lan (Professor)**
 H. Milton Stewart School of Industrial and Systems Engineering, Georgia Tech
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