Tianjiao Li

755 Ferst Drive Northwest,
Atlanta, GA, 30318

E-mail: tli432@gatech.edu
Phone: (470) 452-9327
Google Scholar: scholar.google.com

Research Interest

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

(i) Policy optimization and policy evaluation in reinforcement learning
(ii) Parameter-free first-order methods for convex and nonconvex optimization
(iii) Stochastic optimization methods for statistical learning and machine learning
(iv) Real-life applications, e.g., healthcare, financial industry, and E-commerce

Education

GEORGIA INSTITUTE OF TECHNOLOGY — Atlanta, GA
Ph.D. Candidate in Operations Research, Minor in Machine Learning — Aug 2020 – Aug 2025 (Expected)
- **Advisors:** Guanghui (George) Lan, Ashwin Pananjady **GPA:** 4.0/4.0

GEORGIA INSTITUTE OF TECHNOLOGY — Atlanta, GA
M.S. in Quantitative and Computational Finance — Aug 2019 – May 2021
- **Capstone Project:** Reinforcement Learning Optimized Trading Execution **GPA:** 4.0/4.0

FUDAN UNIVERSITY — Shanghai, China
B.S. in Information and Computational Science — Sep 2015 – Jun 2019

Publications

- **A Simple Uniformly Optimal Method without Line Search for Convex Optimization**
  Tianjiao Li, Guanghui Lan
  Submitted to *Mathematical Programming Series A*

- **Accelerated Stochastic Approximation with State-Dependent Noise**
  Sasila Ilandarideva, Anatoli Juditsky, Guanghui Lan, **Tianjiao Li (alphabetic order)**
  Under minor revision, *Mathematical Programming Series A*

- **Stochastic First-Order Methods for Average-Reward Markov Decision Processes**
  Tianjiao Li, Feiyang Wu, Guanghui Lan
  Under major revision, *Mathematics of Operations Research*

- **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, *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 (alphabetic order)**
  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 (alphabetic order)**
  SIAM Journal on Optimization, vol. 32, no. 2, pp. 1120-1155, 2022

AWARDS

- **Shabbir Ahmed PhD Fellowships for Excellence in Research**
  - Awarded annually to one Ph.D. student (co-winner) in ISyE for research in optimization
- **First Place, Best Poster Award, Georgia Statistics Day 2023**
- **Fudan University Merit Student Award**
- **Fudan University School of Mathematical Sciences Academic Scholarship**

VISITING EXPERIENCE

Laboratoire Jean Kuntzmann, University Grenoble Alpes — Grenoble, France
Visiting Graduate Student — Apr 2024 – May 2024

- **Host**: Anatoli Juditsky
- **Project**: Stochastic Optimization Algorithms for Machine Learning Applications

Simons Institute for the Theory of Computing, UC Berkeley — Berkeley, CA
Visiting Graduate Student — Oct 2021 – Nov 2021

- **Host**: Ashwin Pananjady
- **Program**: Computational Complexity of Statistical Inference

INTER-INSTITUTIONAL COLLABORATION

University of Louisville Health and Hospital — Nov 2023 - Present

- 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

AI Institute for Advances in Optimization: Collaboration with Intel Corporation. — Oct 2022 - May 2023

- 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

AMAZON — Seattle, WA
Applied Scientist Intern — May 2023 - Aug 2023

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

GREENSKY — Atlanta, GA
Summer Analytics Intern — May 2020 - Aug 2020

- Developed a Python-based loss forecasting framework for various consumer credit products, which performs automatic feature selection and consumer default classification based on Lasso regularization and logistic regression

UBS — Shanghai, China
Equity Derivatives Strategy Intern — Mar 2019 - Aug 2019

- Designed volatility dispersion strategies on global Indices and developed dispersion backtesting tools in Python

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 Markov decision processes
- Xiao Huang, ISyE PhD Student, Georgia Tech
  - Georgia Tech ISyE PhD mentoring program

SERVICE

Peer Review:

- **Journals**: *SIAM Journal on Optimization, Mathematical Programming, Computational Optimization and Applications*
- **Conferences**: *COLT 2022, COLT 2023*

Session Organization:

- **International Symposium on Mathematical Programming (ISMP 2024),** Montreal, Canada, Jul 2024
  - Session: Advances in Stochastic First-Order Methods

TALKS AND PRESENTATIONS

- **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
- **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
- **Guest Lecturer**, ISyE 8803, Georgia Tech, Atlanta, GA, Feb 2024
  - Course: Optimization Methods for Reinforcement Learning
  - Instructor: Guanghui (George) Lan
  - Responsibility: 8 Lectures in optimization methods for policy evaluation and average-reward MDPs
- **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
- **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, Sept 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

TECHNICAL SKILLS

Programming: Python (Numpy, Pandas, Scikit-Learn, PyTorch, TensorFlow), C/C++, MATLAB, R, Linux

Tools: Gurobi, Cplex, SAS, SQL, MPI, Git, Google Cloud, AWS