Haoya Li

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Department of Mathematics, Stanford University

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EDUCATION BACKGROUND

Stanford University   *2019 -*

Department of Mathematics, Ph.D. candidate

- Overall GPA: **4.25**/4.00
- Real Analysis: A+, Theory of Probability I: A+, Convex Optimization I: A+, Advanced Reading and Research: A+

Peking University   *2015 - 2019*

School of Mathematical Sciences, Bachelor of Science

- Overall GPA: **3.81**/4.00, Rank: **1**/39, Member of the Elite Undergraduate Training Program in Applied Math
- Mathematical Statistics: 99, Partial Differential Equations: 99, Numerical Optimization: 96, Data Structure: 96

RESEARCH INTERESTS

Machine Learning, Reinforcement Learning, Numerical PDEs, Quantum Computing, Quantum Control, Optimization

RESEARCH EXPERIENCES

Research assistant, Stanford   *Sep 2019 -*

- Developed new data-driven algorithms to solve high dimensional committor equations, elliptic PDEs, and eigenvalue problems with neural networks
- Developed a fast algorithm for solving Mean Field Game (MFG) Equations
- Devise reinforcement learning solvers for quantum control problems
- Devise novel quantum block-encoding algorithms with low gate complexity
- Devise novel quantum phase estimation algorithms for early-fault-tolerant computers

Applied scientist, Amazon   *Jun 2022 - Sep 2022*

- Thoroughly review off-line reinforcement learning literature
- Extract an RL model from the raw data
- Implement off-line RL algorithms and improve upon current methods
- Investigate the problem of action uncertainty in off-line RL

Applied scientist, Amazon   *Jun 2021 - Sep 2021*

- Developed a quasi-Newton method for the policy gradient algorithm with entropy regularization
- Prove the second-order convergence and implement tests on industrial-scale examples
- Developed a quadratically convexified primal-dual formulation for entropy-regularized MDPs
- Proposed an interpolating natural gradient algorithm and prove the global convergence by the Lyapunov method

PUBLICATIONS

- [On low-depth quantum algorithms for robust multiple-phase estimation](#)

  Haoya Li, Hongkang Ni, Lexing Ying, Submitted

- [A note on spike localization for line spectrum estimation](#)

  Haoya Li, Hongkang Ni, Lexing Ying, Submitted

- [On low-depth algorithms for quantum phase estimation](#)

  Hongkang Ni, Haoya Li, Lexing Ying, Submitted

- [On efficient quantum block encoding of pseudo-differential operators](#)

  Haoya Li, Hongkang Ni, Lexing Ying, Submitted

- [Monte Carlo tree search based hybrid optimization of variational quantum circuits](#)
  Jiahao Yao, Haoya Li, Marin Bukov, Lin Lin, Lexing Ying, Accepted by MSML 2022
- [Accelerating primal-dual methods for regularized Markov decision processes](#)
  Haoya Li, Hsiang-fu Yu, Lexing Ying, Inderjit Dhillon, Submitted
- [Approximate-Newton policy gradient algorithms](#)
  Haoya Li, Samarth Gupta, Hsiang-fu Yu, Lexing Ying, Inderjit Dhillon, Under minor revision by SIAM SISC
- [A semigroup method for high dimensional elliptic PDEs and eigenvalue problems based on neural networks](#)
  Haoya Li, Lexing Ying, Journal of Computational Physics
- [A semigroup method for high dimensional committor functions based on neural network](#)
  Haoya Li, Yuehaw Khoo, Yinuo Ren, Lexing Ying, [MSML 2021](#)
- [A simple multiscale method for mean field games](#)
  Haoya Li, Yuwei Fan, Lexing Ying, Journal of Computational Physics

AWARDS AND HONORS

- Outstanding reviewer (top 10%) at ICML 2022 and invited as session chair   2022
- **1st Prize** in National University Physics Competition & National University Math Competition 2016, 2017
- National Scholarship   2018
- Honorary Graduate of the Elite Undergraduate Training Program in Applied Math   2019
- Outstanding Graduate of Peking University   2019

TEACHING EXPERIENCES

- Math 104: Applied Matrix Theory   *Fall 2019, Spring 2020, Winter 2021*
- Math 51: Linear Algebra and Differential Calculus of Several Variables   *Spring 2021*
- Math 172: Lebesgue Integration and Fourier Analysis   *Fall 2021*
- Math 21: Calculus   *Winter 2022*
- Math 53: Ordinary Differential Equations with Linear Algebra   *Fall 2022*
- Math 131P: Partial Differential Equations   *Winter 2023*

PROGRAMMING AND EXTRACURRICULAR ACTIVITIES

- Programming: C/C++, Python, Pyspark, Tensorflow, MATLAB, MPI, OpenMP, CUDA
- Captain and coach of the Softball Team of the School of Mathematical Sciences   2016 - 2019
- Member of Peking University Baseball team   2019
- Inclusive Mentorship in Data Science   2022