

ZECHU (STEVEN) LI

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EDUCATION

Columbia University

B. S. in Computer Science, GPA: 3.91/4.0,

Bard College at Simon's Rock[†]

A. S. in Computer Science, GPA: 3.97/4.0,

Missouri Academy of Science, Mathematics and Computing[†]

A. S. in Computer Science/High School Diplomas, GPA: 3.81/4.0,

New York, NY

Sep. 2020 - May 2022

Great Barrington, MA

Sep. 2017 - May 2020

Maryville, MO

Sep. 2016 - May 2017

RESEARCH EXPERIENCE

Improbable AI Lab, MIT CSAIL

Advisor: Prof. Pulkit Agrawal

Cambridge, MA

Jun. 2022 - Present

- Working on mobile dexterous manipulation in realistic scenarios like kitchen.
- Built deep RL framework that scales up off-policy algorithms in massively parallel simulation. Achieved state-of-the-art (SOTA) performance on sample-efficiency and wall-clock time with 16,000+ parallel environments, e.g., solving a cube reorientation task using Shadow Hand in 10 minutes.

Tensor and Deep Learning Lab, Columbia University

Advisor: Prof. Xiaodong Wang

New York, NY

Sep. 2020 - May 2022

- Proposed a K-spin Hamiltonian regularizer (H -term) to improve the stability of deep RL algorithms, which reduces the training variance of PPO and DDPG by 60% ~ 90%.
- Led two open-source projects, *FinRL* and *ElegantRL*, including processing financial-data, implementing deep RL algorithms, building API documentation websites, and writing blogs.
- Proposed a homomorphic matrix completion scheme for privacy-preserving data completion and guaranteed the exact recovery at the price of more samples.

DitecT Lab, Civil Engineering, Columbia University

Advisor: Prof. Xuan (Sharon) Di

New York, NY

Jan. 2021 - Oct. 2021

- Extended the social learning (SL) scheme to Markov games and leveraged deep RL to investigate the cooperation between individual autonomous vehicles (AVs) in a multi-agent system.

PUBLICATIONS

Parallel Q-Learning: Scaling Off-policy Reinforcement Learning

Steven Li*, Tao Chen*, Zhang-Wei Hong, Anurag Ajay and Pulkit Agrawal.

International Conference on Learning Representations (ICLR), 2023, (in submission).

Stationary Deep Reinforcement Learning with Quantum K-spin Hamiltonian Equation

X.-Y. Liu*, Steven Li*, Shixun Wu and Xiaodong Wang.

International Conference on Learning Representations (ICLR), 2023, (in submission).

ElegantRL: Massively Parallel Framework for Cloud-native Deep Reinforcement Learning

Steven Li*, X.-Y. Liu*, Zhuoran Yang, J. Zheng, Zhaoran Wang, J. Guo, Xiaodong Wang, and Michael I. Jordan.

Journal of Machine Learning Research (JMLR), Open Source Software, 2022, (under preparation).

[†]Both are early colleges. I started my undergraduate study at age 16.

Homomorphic Matrix Completion

X.-Y. Liu*, **Steven Li***, and Xiaodong Wang.

Neural Information Processing Systems (NeurIPS), 2022.

Social Learning in Markov Games: Empowering Autonomous Driving

Xu Chen, **Steven Li** and Xuan (Sharon) Di.

IEEE Intelligent Vehicles Symposium (IV), 2022.

ElegantRL-Podracers: Scalable and Elastic Library for Cloud-native Deep Reinforcement Learning

X.-Y. Liu*, **Steven Li***, Zhuoran Yang, Jiahao Zheng, Zhaoran Wang, Anwar Walid, Jian Guo and Michael I. Jordan.

Deep Reinforcement Learning Workshop, Neural Information Processing Systems (NeurIPS), 2021.

FinRL-Podracers: High Performance and Scalable Deep Reinforcement Learning for Quantitative Finance

Steven Li, X.-Y. Liu, Jiahao Zheng, Zhaoran Wang, Anwar Walid and Jian Guo.

ACM International Conference on AI in Finance (ICAIF), 2021.

Tensor Decompositions for Compressing and Accelerating Deep Neural Networks

X.-Y. Liu, Yiming Fang, Liuqing Yang, **Steven Li** and Anwar Walid.

[Book] Tensors for Data Processing, Elsevier, 2020.

OPEN-SOURCE PROJECTS

FinRL: Deep Reinforcement Learning for Quantitative Finance (with $\geq 6,200$ stars on GitHub)

- Established the pipeline of financial market data processing from acquiring data, cleaning data, and extracting features
- Developed cloud-level solution of FinRL, called FinRL-Podracers.

ElegantRL: Scalable and Elastic Deep Reinforcement Learning (with $\geq 2,400$ stars on GitHub)

- Implemented state-of-the-art DRL algorithms (e.g., DQN, DDPG, SAC, and PPO) and techniques (e.g., prioritized experience replay (PER), and random network distillation (RND)).
- Built API documentation website for user instruction, tutorials, and demos.
- Wrote 10+ technical blogs for algorithm and application tutorials on Medium.

HONORS & ACTIVITIES

Languages: Chinese (native) | English (fluent) | Spanish (beginner)

Awards and Honors: ICAIF Scholarship; Bonomi Scholar Undergraduate Researcher; Dean's List.

Sports: Champion of Ivy League Cup 2021; Champion of Columbia University 7V7 Outdoor Soccer Men's Competitive Intramural 2021.

Academic Presentations:

- NeurIPS 2021, 2nd Workshop on Quantum Tensor Networks in Machine Learning, Dec. 14, 2021.
- NeurIPS 2021, 7th Workshop on Deep Reinforcement Learning, Dec. 13, 2021.
- Invited by Wolfe Research to present FinRL at 5th Annual QES Global Quantitative and Macro Investing Conference, Nov. 08, 2021.
- 2nd ACM International Conference on AI in Finance, Nov. 03, 2021.