

MIAO LU

Tel: 650-250-9790 | E-mail: miaolu@stanford.edu | Web: miaolu3.github.io

Google Scholar | LinkedIn | Last update: Feb. 2025

EDUCATION

Stanford University

Ph.D. in Operations Research, advised by Jose Blanchet.

Stanford, USA

Sep.2023 - present

University of Science and Technology of China

B.S. in Mathematics & Applied Mathematics, with summa cum laude.

Hefei, China

Sep.2018 - Jun.2022

RESEARCH INTERESTS

My ultimate goal of research is to: (i) develop the *theoretical foundations* of the next generation artificial intelligence (AI) techniques and (ii) make the *best use of* AI to effectively address challenging managerial and societal problems. Towards such a goal, I work on the theory and applications of reinforcement learning, deep learning, and large foundation models.

PUBLICATIONS

- [10] Can Neural Networks Achieve Optimal Computational-statistical Tradeoff? An Analysis on Single-Index Model
Siyu Chen*, Beining Wu*, Miao Lu, Zhuoran Yang, Tianhao Wang
International Conference on Learning Representations (ICLR) 2025 **Oral**
NeurIPS Workshop on Mathematics of Modern Machine Learning (M3L) 2024 **Oral**
- [9] Provably Mitigating Overoptimization in RLHF: Your SFT Loss is Implicitly an Adversarial Regularizer
Zhihan Liu*, Miao Lu*, Shenao Zhang, Boyi Liu, Hongyi Guo, Yingxiang Yang, Jose Blanchet, Zhaoran Wang
Neural Information Processing Systems (NeurIPS) 2024
ICML Workshop on Aligning Reinforcement Learning Experimentalists and Theorists (ARLET) 2024
- [8] Distributionally Robust Reinforcement Learning with Interactive Data Collection: Fundamental Hardness and Near-Optimal Algorithm
Miao Lu*, Han Zhong*, Tong Zhang, Jose Blanchet
Neural Information Processing Systems (NeurIPS) 2024
ICML Workshop on Aligning Reinforcement Learning Experimentalists and Theorists (ARLET) 2024
- [7] Benign Oscillation of Stochastic Gradient Descent with Large Learning Rates
Miao Lu*, Beining Wu*, Xiaodong Yang, Difan Zou
International Conference on Learning Representations (ICLR) 2024
NeurIPS Workshop on Mathematics of Modern Machine Learning (M3L) 2023
- [6] Double Pessimism is Provably Efficient for Distributionally Robust Offline Reinforcement Learning: Generic Algorithm and Robust Partial Coverage
Jose Blanchet[†], Miao Lu[†], Tong Zhang[†], Han Zhong[†]
Neural Information Processing Systems (NeurIPS) 2023
Extended version under major revision at *Mathematics of Operations Research (MOR)*
- [5] Maximize to Explore: One Objective Function Fusing Estimation, Planning, and Exploration
Zhihan Liu*, Miao Lu*, Wei Xiong*, Han Zhong, Hao Hu, Shenao Zhang, Sirui Zheng, Zhuoran Yang, Zhaoran Wang
Neural Information Processing Systems (NeurIPS) 2023 **Spotlight**
- [4] Pessimism in the Face of Confounders: Provably Efficient Offline Reinforcement Learning in Partially Observable Markov Decision Processes
Miao Lu, Yifei Min, Zhaoran Wang, Zhuoran Yang
International Conference on Learning Representations (ICLR) 2023
- [3] Welfare Maximization in Competitive Equilibrium: Reinforcement Learning for Markov Exchange Economy
Zhihan Liu*, Miao Lu*, Zhaoran Wang, Michael I. Jordan, Zhuoran Yang
International Conference on Machine Learning (ICML) 2022

- [2] Learning Pruning-Friendly Networks via Frank-Wolfe: One-Shot, Any-Sparsity, and No Retraining
Miao Lu*, Xiaolong Luo*, Tianlong Chen, Wuyang Chen, Dong Liu, Zhangyang Wang
International Conference on Learning Representations (ICLR) 2022 Spotlight
- [1] Learning Robust Policy against Disturbance in Transition Dynamics via State-Conservative Policy Optimization
Yufei Kuang, Miao Lu, Jie Wang, Qi Zhou, Bin Li, Houqiang Li
Association for Advancement of Artificial Intelligence (AAAI) 2022

(Note: authors with * contributed equally to the work, and [†] represents alphabetical order.)

PREPRINTS

- [1] Learning an Optimal Assortment Policy under Observational Data
Yuxuan Han, Han Zhong, Miao Lu, Jose Blanchet, Zhengyuan Zhou
arXiv preprint, Feb, 2025

INDUSTRIAL EXPERIENCES

ByteDance Seed Student researcher in foundation models	<i>San Jose, USA Starting Jun.2025</i>
Ubiquant Investment Quantitative research intern	<i>Shanghai, China Jun.2022 - Sep.2022</i>

RESEARCH VISITING EXPERIENCES

Toyota Technological Institute at Chicago Student visitor hosted by Tianhao Wang and Zhiyuan Li	<i>Chicago, USA July.2024 - Aug.2024</i>
The University of Hong Kong Research assistant hosted by Difan Zou, Dept. of Computer Science & Institute of Data Science	<i>Hong Kong, China Apr.2023 - Aug.2023</i>

AWARDS AND HONORS

Xinhe Scholarship (outstanding undergraduate researchers, School of the Gifted Young, USTC)	<i>Mar.2023</i>
Yuanqing Yang Scholarship (top scholarship, School of Mathematical Sciences, USTC)	<i>Jan.2022</i>
The 41st Guo Moruo Scholarship (highest honor, USTC)	<i>Dec.2021</i>
Chinese National Scholarship (top scholarship, Ministry of Education of China)	<i>Nov.2019, 2020</i>

INVITED TALKS

Computational-statistical Trade-off of Learning Single-index Models via Neural Networks [10]	
◦ 2nd Mathematics of Modern Machine Learning Workshop (M3L), Vancouver, BC, Canada	<i>Dec.2024</i>
Theoretical Foundations of Distributionally Robust Reinforcement Learning [6, 8]	
◦ 2024 INFORMS annual meeting, Seattle, WA, USA [8]	<i>Oct.2024</i>
◦ 58th Annual Conference on Information Sciences and Systems (CISS), Princeton, NJ, USA [6]	<i>Mar.2024</i>
◦ 2023 INFORMS annual meeting, Phoenix, AZ, USA [6]	<i>Oct.2023</i>

TEACHING ASSISTANT

Differential Equations (2020 fall, USTC) (PI: Wuqing Ning, Dept. of Applied Math., USTC)	<i>Sep.2020 - Jan.2021</i>
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ACADEMIC SERVICES

Journal Reviewer Annals of Applied Probability (AOAP), Operations Research (OR), Mathematics of Operations Research (MOR), Transactions on Machine Learning Research (TMLR)	
Conference Reviewer Neural Information Processing Systems (NeurIPS; 2023, 2024), International Conference on Machine Learning (ICML; 2024,	

2025), International Conference on Learning Representations (ICLR; 2024, 2025), International Conference on Artificial Intelligence and Statistics (AISTATS; 2025), ICML Workshop on Aligning Reinforcement Learning Experimentalists and Theorists (ARLET; 2024), NeurIPS Workshop on Mathematics of Modern Machine Learning (M3L; 2024), Association for the Advancement of Artificial Intelligence (AAAI; 2025)