

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 & VISITING EXPERIENCES

ByteDance Seed Student researcher in foundation models	<i>San Jose, USA</i> <i>Starting Jun.2025</i>
Toyota Technological Institute at Chicago Student visitor hosted by Tianhao Wang and Zhiyuan Li	<i>Chicago, USA</i> <i>July.2024 - Aug.2024</i>
The University of Hong Kong Research assistant hosted by Difan Zou, Dept. of CS & IDS	<i>Hong Kong, China</i> <i>Feb.2023 - Aug.2023</i>
Ubiquant Investment Quantitative research intern	<i>Shanghai, China</i> <i>Jun.2022 - Sep.2022</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)