

MIAO LU

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EDUCATION

Stanford University

Ph.D. student in Operations Research, Department of Management Science & Engineering
Advisor: 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 research interests are primarily in designing and analyzing both *robust* and *efficient* machine learning methods, with a special focus on theoretical foundations. With such a goal, I work broadly across the theory and practices of reinforcement learning and deep learning. Currently I'm also interested in large language models and its interaction with decision making.

PUBLICATIONS

- [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 review 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.)

RESEARCH VISITING EXPERIENCES

Toyota Technological Institute at Chicago
Student visitor hosted by Tianhao Wang and Zhiyuan Li

Chicago, USA
July.2024 - Aug.2024

The University of Hong Kong
Research assistant hosted by Difan Zou, Dept. of Computer Science & Institute of Data Science

Hong Kong, China
Apr.2023 - Aug.2023

INDUSTRIAL EXPERIENCES

Ubiquant Investment
Quantitative research internship, AI Department

Shanghai, China
Jun.2022 - Sep.2022

AWARDS AND HONORS

Xinhe Scholarship (outstanding undergraduate researchers, School of the Gifted Young, USTC)

Mar.2023

Yuanqing Yang Scholarship (top scholarship, School of Mathematical Sciences, USTC)

Jan.2022

The 41st Guo Moruo Scholarship (highest honor, USTC)

Dec.2021

Chinese National Scholarship (top scholarship, Ministry of Education of China)

Nov.2019, 2020

INVITED TALKS

Theoretical Foundations of Distributionally Robust Reinforcement Learning [6, 8]

- 2024 INFORMS annual meeting, Seattle, WA, USA [8]
- 58th Annual Conference on Information Sciences and Systems (CISS), Princeton, NJ, USA [6]
- 2023 INFORMS annual meeting, Phoenix, AZ, USA [6]

Oct.2024

Mar.2024

Oct.2023

TEACHING ASSISTANT

Differential Equations (2020 fall, USTC) (PI: Wuqing Ning, Dept. of Applied Math., USTC) *Sep.2020 - Jan.2021*

ACADEMIC SERVICES

Journal Reviewer

Annals of Applied Probability (AOAP)
Operations Research (OR)

Conference Reviewer

International Conference on Machine Learning (ICML; 2024)
International Conference on Learning Representations (ICLR; 2024, 2025)
Neural Information Processing Systems (NeurIPS; 2023, 2024)
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)

SKILLS

Quantitative Skills

Statistics, Optimization, Machine Learning, Reinforcement learning, Deep learning, Large language models

Programming Languages and Tools

Fluent: Python, Pytorch, Git, LaTeX; Familiar: C/C++, R