MINGHUAN LIU

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EDUCATION

Shanghai Jiao Tong University (SJTU) *Sep. 2019 - Dec. 2024 Expected*
Ph.D. candidate in Computer Science and Technology
- Apex Data & Knowledge Management Lab
- Prior Leader of the ApexRL research group
- Advisor: Weinan Zhang
- Member of Wu Wen Jun Honorary Doctoral Plan (Advisor: Cewu Lu)

University of California San Diego (UCSD) *Sep. 2023 - Aug. 2024*
Visiting Ph.D. in Electrical and Computer Engineering
- Advisor: Xiaolong Wang

Southwest Jiaotong University (SWJTU) *Sep. 2015 - July. 2019*
B.S. in Computer Science and Technology
- Overall GPA: 3.84/4.0 Ranking: 1/98
- Key Lab of Cloud Computing and Intelligent Technology
- Advisor: Tianrui Li

RESEARCH INTERESTS

- My research interests lie in the general area of **decision modeling**. Particularly, I was devoted to (data-driven) **reinforcement learning (RL)** methods (such as **imitation learning (IL)**, **offline RL**) and also **foundation models** that can help resolve real-world decision-making challenges.

- Recently, I have been working on one of the most complicated decision-making problems, **robots**, aiming at taking intelligent robots closer to real life, e.g., expanding the skills of robots, and helping robots make smart decisions. In detail, my works focus on how to generate and utilize robot data to control robots, such as **sim2real**, **robot teleoperation**, **imitation**, and **real2sim**. I believe we should construct a data-efficient robot training and evaluation cycle, and develop the robot control system in a well-designed hierarchical way. I do not believe fully end2end learning in robot control.

PUBLICATIONS / PREPRINTS

(*Equal Contribution)

18 **GenSim2: Scalable Robotic Data Generation with Multi-modal LLMs.** **[GenSim2 Page]**
Pu Hua*, **Minghuan Liu***, Annabella Macaluso*, Yunfeng Lin, Weinan Zhang, Huazhe Xu, Lirui Wang
CoRL 2024.

17 **ACE: A Cross-platform Visual-Exoskeletons for Low-Cost Dexterous Teleoperation.** **[ACE Page]**
Shiqi Yang, **Minghuan Liu**, Yuzhe Qin, Runyu Ding, Jialong Li, Xuxin Cheng, Ruihan Yang, Sha Yi, Xiaolong Wang
CoRL 2024.

16 **Visual Whole-Body Control for Legged Loco-Manipulation.** **[VBC Page]**
Minghuan Liu*, Zixuan Chen*, Xuxin Cheng, Yandong Ji, Ruihan Yang, Xiaolong Wang
CoRL 2024.

15 **Large Visual-Language Models as Effective Robot Imitators.** [RoboFlamingo Page]
Xinghang Li*, **Minghuan Liu***, Hanbo Zhang, Cunjun Yu, Jie Xu, Hongtao Wu, Chilam Cheang, Ya Jing, Weinan Zhang, Huaping Liu, Hang Li, Tao Kong
ICLR 2024. Spotlight.

14 **Unleashing Large-Scale Video Generative Pre-training for Visual Robot Manipulation.** [GR1 Page]
Hongtao Wu, Ya Jing, Chilam Cheang, Guangzeng Chen, Jiafeng Xu, Xinghang Li, **Minghuan Liu**, Hang Li, Tao Kong
ICLR 2024.

13 **MADiff: Offline Multi-agent Learning with Diffusion Models.**
Zhengbang Zhu*, **Minghuan Liu***, Liyuan Mao, Bingyi Kang, Minkai Xu, Yong Yu, Stefano Ermon, Weinan Zhang
NeurIPS 2024.

12 **Is Risk-Sensitive Reinforcement Learning Properly Resolved?**
Ruiwen Zhou, **Minghuan Liu**, Kan Ren, Xufang Luo, Weinan Zhang, Dongsheng Li
Arxiv.

11 **Visual Imitation Learning with Patch Rewards.** [PatchAIL Page]
Minghuan Liu, Tairan He, Weinan Zhang, Shuicheng Yan, Zhongwen Xu.
ICLR 2023.

10 **PerfectDou: Dominating DouDizhu with Perfect Information Distillation.** [PerfectDou Page]
Guan Yang*, **Minghuan Liu***, Weijun Hong, Weinan Zhang, Fei Fang, Guangjun Zeng, Yue Lin.
NeurIPS 2022.

9 **Reinforcement Learning with Automated Auxiliary Loss Search.**
Tairan He, Yuge Zhang, Kan Ren, **Minghuan Liu**, Che Wang, Weinan Zhang, Dongsheng Li, Yuqing Yang.
NeurIPS 2022.

8 **Plan Your Target and Learn Your Skills: Transferable State-Only Imitation Learning via Decoupled Policy Optimization.** [DePO Page]
Minghuan Liu, Zhengbang Zhu, Yuzheng Zhuang, Weinan Zhang, Jun Wang, Yong Yu, Jianye Hao.
ICML 2022.

7 **Goal-Conditioned Reinforcement Learning: Problems and Solutions.**
Minghuan Liu, Menghui Zhu, Weinan Zhang.
IJCAI 2022 (Survey Track).

6 **Curriculum Offline Imitation Learning.**
Minghuan Liu*, Hanye Zhao*, Zhengyu Yang, Jian Shen, Weinan Zhang, Li Zhao, Tie-Yan Liu.
NeurIPS 2021.

5 **MapGo: Model-Assisted Policy Optimization for Goal-Oriented Tasks.**
Menghui Zhu*, **Minghuan Liu***, Jian Shen, Zhicheng Zhang, Sheng Chen, Weinan Zhang, Deheng Ye, Yong Yu, Qiang Fu, Wei Yang.
IJCAI 2021.

4 **Energy-Based Imitation Learning.**

Minghuan Liu, Tairan He, Minkai Xu, Weinan Zhang.
AAMAS 2020. Oral.

3 **Multi-Agent Interactions Modeling with Correlated Policies.**
Minghuan Liu, Ming Zhou, Weinan Zhang, Yuzheng Zhuang, Jun Wang, Wulong Liu, Yong Yu.
ICLR 2020.

2 **Towards Applicable Reinforcement Learning: Improving the Generalization and Sample Efficiency with Policy Ensemble.**
Zhengyu Yang, Kan Ren, Xufang Luo, **Minghuan Liu**, Weiqing Liu, Jiang Bian, Weinan Zhang, Dongsheng Li.
IJCAI 2022.

1 **Learning to Build High-fidelity and Robust Environment Models.**
Weinan Zhang, Zhengyu Yang, Jian Shen, **Minghuan Liu**, Yimin Huang, Xing Zhang, Ruiming Tang, Zhenguo Li.
ECML-PKDD 2021.

AWARDS & HONORS

ByteDance Scholarship (Only 10 in China) *2022*

NeurIPS 2022 Top Reviewer *2022*

China National Scholarship for Ph.D. (1‰) *2022*

TOP 1, Ubiquant Special Retro Snake Challenge (Bonus $\sim$ $10k) *2022*

TOP 6, Finalist of Sports Analytics Challenge (sponsored by PSG) *2019*

TOP 10, SCADA Data Missing Repair Competition *2019*

TOP 3, AI Challenger 2018 in Weather Forecasting *2018*

Sishiyanghua Medal (Only 10 in university) *2019*

Outstanding Graduate *2019*

National First Prize, China Undergraduate Mathematical Contest in Modeling *2017*

Meritorious Winner, Mathematical Contest In Modeling *2017*

China National Scholarship $\times$ 2 (1%) *2016&2017*

Tang Lixin Scholarship (1‰) *2017*

IBM Scholarship (1‰) *2017*

Special Grade Comprehensive Scholarship $\times$ 4 (1%) *2016 - 2018*

SERVICES

Conference Reviewer: NeurIPS'21'22'23, ICML'21'22'23, ICLR'23'24, CVPR'24, IJCAI'24

SKILLS

Machine Learning: Pytorch, Jax, Tensorflow, Scikit-Learn, LightGBM

Programming Languages: Python, JavaScript, C / C++, Java, MATLAB

Standard Tests: CET-6(574), CET4(616)

Hobbies and Interests: Soccer, Tennis, Gym, Swimming