Xiao Ma

Research Scientist @ TikTok
e-mail: xiao.ma@bytedance.com   Personal Website   Google Scholar

Education

National University of Singapore (NUS), Singapore	Aug. 2017 - Dec. 2021

Doctor of Philosophy in Computer Science
Advisor: Prof. David Hsu

Shanghai Jiao Tong University (SJTU), Shanghai	Sept. 2013 - July 2017

Bachelor of Engineering in Computer Science and Technology
Advisors: Prof. Xiaofeng Gao and Prof. Fan Wu

Work Experiences

Research Scientist at TikTok	July 2024 - present
Lead Researcher at Dyson Robot Learning Lab	Feb. 2023 - July 2024
Research Scientist at SEA AI Lab	Jul. 2021 - Jan. 2023
Research Intern at SEA AI Lab (hosted by Dr. Min Lin and Dr. Shuicheng Yan)	Apr. 2021 - Jun. 2021
Research Intern at SenseTime Research (hosted by Dr. Shuai Yi)	Oct. 2019 - Sept. 2020
Software Engineer Intern at Intel Asia Pacific R & D Center	May 2016 - Dec. 2016

Research

My research mainly focuses on building generalizable, efficient, and self-improving robot learning systems in unstructured daily environments. This long-term objective has motivated my research topics of the reinforcement learning, the representation learning, the multi-modal systems, and their applications in robotics.

My work about learning composable robot systems with Differentiable Algorithm Networks (DAN) was selected as the **best system paper finalist** and **best student paper finalist** at the *Robotics: Science and Systems* (RSS), 2019.

Preprints

1. Yang Yue, Bingyi Kang, **Xiao Ma**, Zhongwen Xu, Gao Huang, Shuicheng Yan. "Offline Prioritized Experience Replay", *arXiv preprint arXiv:2306.05412*

2. Bingyi Kang*, **Xiao Ma***, Yirui Wang, Yang Yue, Shuicheng Yan. "Improving and Benchmarking Offline Reinforcement Learning Algorithms", *arXiv preprint arXiv:2306.00972* (*equal contribution)

3. Eugene Teoh*, Sumit Patidar*, **Xiao Ma**, Stephen James. "Green Screen Augmentation Enables Scene Generalisation in Robotic Manipulation", *arXiv preprint arXiv:2407.07868* (*equal contribution)

4. Nikita Chernyadev*, Nicholas Backshall*, **Xiao Ma***, Yunfan Lu, Younggyo Seo, Stephen James. "Bi-Gym: A Demo-Driven Mobile Bi-Manual Manipulation Benchmark", *arXiv preprint arXiv:2407.07788* (*equal contribution)

Publications

1. **Xiao Ma**, Sumit Patidar, Iain Haughton, Stephen James. "Hierarchical Diffusion Policy for Kinematics-Aware Multi-Task Robotic Manipulation", *Computer Vision and Pattern Recognition (CVPR), 2024*

2. Pietro Mazzaglia, Nicholas Backshall, **Xiao Ma**, Stephen James. "Redundancy-aware Action Spaces for Robot Learning", *IEEE Robotics and Automation Letters (RA-L), 2024*

3. **Xiao Ma***, Bingyi Kang*, Zhongwen Xu, Min Lin, Shuicheng Yan. "Mutual Information Regularized Offline Reinforcement Learning", *Conference on Neural Information Processing Systems (NeurIPS), 2023* (*equal contribution)

4. Bingyi Kang*, **Xiao Ma***, Chao Du, Tianyu Pang, Shuicheng Yan. "Efficient Diffusion Policies for Offline

Reinforcement Learning", *Conference on Neural Information Processing Systems (NeurIPS), 2023* (*equal contribution)

5. Jiawei Ren*, Mingyuan Zhang*, Cunjun Yu*, **Xiao Ma**, Liang Pan, Ziwei Liu. "InsActor: Instruction-driven Physics-based Characters", *Conference on Neural Information Processing Systems (NeurIPS), 2023* (*equal contribution)

6. Siwei Chen, **Xiao Ma**, Zhongwen Xu. "Imitation Learning via Differentiable Physics", *Computer Vision and Pattern Recognition (CVPR), 2023*

7. Siwei Chen*, Cunjun Yu*, Yiqing Xu*, Linfeng Li, **Xiao Ma**, Zhongwen Xu, David Hsu. "Benchmarking Deformable Object Manipulation with Differentiable Physics", *International Conference on Learning Representations (ICLR), 2023* (**oral**, *equal contribution)

8. Jiawei Ren*, Cunjun Yu*, Siwei Chen, **Xiao Ma**, Liang Pan, Ziwei Liu. "DiffMimic: Efficient Motion Mimicking with Differentiable Physics", *International Conference on Learning Representations (ICLR), 2023* (*equal contribution)

9. Wei Qiu, **Xiao Ma**, Bo An, Svetlana Obraztsova, Shuicheng Yan, Zhongwen Xu. "RPM: Generalizable Behaviors for Multi-Agent Reinforcement Learning", *International Conference on Learning Representations (ICLR), 2023*

10. Hai Nguyen*, Zhihan Yang*, Andrea Baisero, **Xiao Ma**, Robert Platt, Christopher Amato. "Hierarchical Reinforcement Learning under Mixed Observability", *Workshop on the Algorithmic Foundations of Robotics (WAFR), 2022* (*equal contribution)

11. **Xiao Ma**, David Hsu, Wee Sun Lee. "Learning Latent Graph Dynamics for Visual Manipulation of Deformable Objects", *International Conference on Robotics and Automation (ICRA), 2022*

12. Daisheng Jin*, **Xiao Ma***, Chongzhi Zhang, Yizhuo Zhou, Jiashu Tao, Mingyuan Zhang, Zhoujun Li, Xiaolong Liu. "Towards Overcoming False Positives in Visual Relationship Detection", *British Machine Vision Conference (BMVC), 2021* (*equal contribution)

13. **Xiao Ma**, Siwei Chen, David Hsu, Wee Sun Lee. "Contrastive Variational Model-Based Reinforcement Learning for Complex Observations", *The 4nd Conference on Robot Learning (CoRL), 2020*

14. Jiawei Ren, Cunjun Yu, Shunan Sheng, **Xiao Ma**, Haiyu Zhao, Shuai Yi, Hongsheng Li. "Balanced Meta-Softmax for Long-Tailed Visual Recognition", *Advances in Neural Information Processing Systems (NeurIPS), 2020*

15. Siwei Chen, **Xiao Ma**, David Hsu. "DinerDash Gym: A Benchmark for Policy Learning in High-Dimensional Action Space", *In IL workshop, Robotics: Science and Systems (RSS), 2020*

16. Cunjun Yu*, **Xiao Ma***, Jiawei Ren, Haiyu Zhao, Shuai Yi. "Spatio-Temporal Graph Transformer Networks for Pedestrian Trajectory Prediction", *European Conference on Computer Vision (ECCV), 2020* (*equal contribution)

17. Zuowu Zheng, Xiaofeng Gao, **Xiao Ma**, Guihai Chen. "Predicting Hot Events in the Early Period through Bayesian Model for Social Networks", *IEEE Transactions on Knowledge and Data Engineering (TKDE), 2020*

18. **Xiao Ma**, Peter Karkus, David Hsu, Wee Sun Lee, Nan Ye. "Discriminative Particle Filter Reinforcement Learning for Complex Partial Observations", *International Conference on Learning Representations (ICLR), 2020*

19. **Xiao Ma***, Peter Karkus*, David Hsu, Wee Sun Lee. "Particle Filter Recurrent Neural Networks", *AAAI Conference on Artificial Intelligence (AAAI), 2020* (*equal contribution)

20. Peter Karkus, **Xiao Ma**, David Hsu, Leslie Pack Kaelbling, Wee Sun Lee, Tomas Lozano-Perez. "Differentiable Algorithm Networks for Composable Robot Learning", *Robotics: Science and Systems (RSS), 2019* (**Best Student/System Paper Finalist**)

21. **Xiao Ma**, Peter Karkus, David Hsu, Wee Sun Lee "PF-LSTM: Belief State Particle Filter for LSTM", *In RLPO Workshop, Advances in Neural Information Processing Systems (NeurIPS), 2018*

22. **Xiao Ma**, Xiaofeng Gao, Guihai Chen. "BEEP: a Bayesian perspective Early state Event Prediction model for online social networks", *IEEE International Conference on Data Mining (ICDM), 2017*

23. **Xiao Ma**, Zhenzhe Zheng, Fan Wu and Guihai Chen. "Trust-Based Time Series Data Model for Mobile Crowdsensing", *IEEE International Conference on Communications (ICC), 2017*

AWARDS

NUS School of Computing Research Achievement Award	2020
Robotics: Science and Systems Best Student Paper Finalist	2019
Robotics: Science and Systems Best System Paper Finalist	2019
NUS Research Scholarship	2017
Excellent Project of the *National Undergraduate Training Programs for Innovation*	2016
Academic Excellence Scholarship, SJTU	2016, 2014
Honorable Mention of Mathematical Contest In Modeling	2015, 2016

PROFESSIONAL ACTIVITIES

Reviewer

- Conferences: NeurIPS (2020 - 2024), WACV (2021 - 2023), ICRA (2021 - 2023), AAAI (2021 - 2023), CVPR (2021 - 2023), ICLR (2022 - 2023), ICML (2022 - 2024)
- Journals: RA-L (2021 - 2023)

Teaching

- CS3243: Introduction to Artificial Intelligence (Spring 2018)
- CS6244: Robot Motion Planning and Control (Winter 2018)
- CS5478: Intelligent Robots: Algorithms and Systems (Spring 2020)