Yao Mu

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Bio

I am currently a PhD student at the **Department of Computer Science, the University of Hong Kong**. Previously I obtained the M.Phil Degree at **Tsinghua University** and won many honors such as **Outstanding Graduate of Tsinghua University** and **Outstanding Graduation Thesis Award** at Tsinghua University. I got my bachelor's degree from the Department of Vehicle Engineering, **Harbin Institute of Technology** with **GPA of 95.11/100, ranking the first in my major (top 0.74%)** and obtained the **Excellent Provincial Graduates** and **Triple-A Student Pacesetter**.

I have received **6 Scholarships**, including **Hong Kong PhD Fellowship Scheme (HKPFS)**, **HKU Presidential PhD Scholar Programme (HKU-PS)**, **National scholarship 3 times** and Principal first-Class Scholarship. I have earned myself **5 national/international competition awards** and **4 provincial prizes**.

I have published **4 top-tier AI/Robotics conference papers** as the **first author**, including the **NeurIPS 2021, NeurIPS 2022** (Conference on Neural Information Processing Systems, *CCF A class*), **ICML 2022** (International Conference on Machine Learning, *CCF A class*), and obtained the **Student Best Paper Award** in the **20th ICCAS** (International Conference on Control, Automation and Systems), **Finalists for the Best Student Paper Award of IV2021** (3/450). Besides, I have also published **7 conference papers and 1 journal paper** as co-author on **ICML2022**, **NeurIPS2022**,**CVPR2022** (Conference on Computer Vision and Pattern Recognition), **IJCAI2022** (International Joint Conference on Artificial Intelligence), **CDC** (Conference on Decision and Control 2021, *best conference in control field*) , **IV** (IEEE Intelligent Vehicles Symposium) and **IEEE TNNLS**(IEEE Transactions on Neural Networks and Learning Systems).

I am served as **the PC reviewer of** the Conference on Neural Information Processing Systems (**NeurIPS**), the International Conference on Machine Learning (**ICML**), IEEE / CVF Computer Vision and Pattern Recognition Conference (**CVPR**), AAAI Conference on Artificial Intelligence (**AAAI**), International Conference on Artificial Intelligence and Statistics (**AISTATS**), IEEE Intelligent Transportation Systems Society Conference (**ITSC**), IEEE Intelligent Vehicles Symposium (**IV**) and Journal of Automobile Engineering.

My research interest focus on **Embodied AI**, **Reinforcement Learning**, **Representation Learning**, **Robotic Control** and **Autonomous Driving**.

Education

- **The University of Hong Kong**
  PhD candidate in Computer Science; *Aug. 2021 – Present*
  - In year 2021, ranks the 22^{th} in QS World University Rankings.
  - I am supervised by **Prof. Ping Luo**, who was named one of the young innovators by the MIT Technology Review "Innovators Under 35 (MIT TR 35)" Asia Pacific, and co-supervised by **Prof. Wenping Wang** (ACM Fellow, IEEE Fellow) and study in the **HKUMMLab**. I also work very close with Prof. Jianyu Chen, the assistant professor at Institute for Interdisciplinary Information Sciences (IIIS).

- **Tsinghua University (C9, Double First Class)** China
  Master in intelligent vehicle Engineering; ***GPA: 3.78/4.0; Ranking 17/64*** *Sep. 2018 – June. 2021*
  - In year 2020, Tsinghua University ranks the 1^{st} in QS Chinese University Ranking and ranks the 15^{th} in QS international University Ranking.
  - I obtained the M.Phil Degree under the supervision of Prof. Bo Cheng and Prof. Shengbo Li at the Intelligent Driving Laboratory
  - Courses with full marks 4.0: "Algorithm Analysis and Design" "Optimal Control" "Applied Stochastic Processes" "Advanced Machine Learning" "Intelligent Transportation Systems Modeling and Simulation" "Statistical Learning Theory and Applications" "Reinforcement Learning and Control" "Vehicle Control Engineering".

- **Harbin institute of technology (HIT, C9, Double First Class)** China
  Bachelor in Vehicle Engineering; ***GPA: 92.01/100; Ranking 1/135 (Top 0.74%)*** *Sep. 2014 – Jun. 2018*
  - Graduated with the honor of "Provincial Excellent Graduate" of Harbin institute of technology. (Top 10%)
  - Graduated with the honor of "Provincial Triple-A Student Pacesetter". (***Top 0.4%***, 10 out of 2400 students)

Honours and Awards

- **Scholarships**
  - Hong Kong PhD Fellowship Scheme (**HKPFS**)
  - HKU Presidential PhD Scholar Programme (**HKU-PS**)
  - National Scholarship for 2014/2015 academic year (***Top 1%***, 2 out of 135 students in HIT)
  - National Scholarship for 2015/2016 academic year (***Top 1%***, 2 out of 135 students in HIT)
  - National Scholarship for 2016/2017 academic year (***Top 1%***, 2 out of 135 students in HIT)
  - First-Class Scholarship for 2014/2015 academic year (***Top 10%***, 13 out of 135 students in HIT)
- **Academic Competitions Awards**
  - **Student Best Paper Award** in the 20th International Conference on Control, Automation and Systems (ICCAS) (***Top 1%*** (5/500) among accepted papers from 25 countries)
  - **Finalists for the Student Best Paper Award** of IV2021 (***(3/450)***
  - 2^{st} Prize of National College Student Energy Conservation and Emission Reduction Competition (***Top 5%*** in China)
  - Meritorious Winner Award in Interdisciplinary Contest in Modeling (***Top 13%*** worldwide)
  - 2^{nd} Second Prize of National College students Ocean Vehicle Design and Production competition (Top 5% in China)
  - 3^{rd} of National College Student Mathematics Competition (***Top 10%*** in China)
  - 1^{st} Prize (provincial) of National College Student Mathematical Modeling Competition (***Top 10%***, in China)
- **Honours**
  - **Outstanding Graduate** of Tsinghua University
  - **Outstanding Thesis Award**, Tsinghua University
  - Provincial excellent student award (***Top 1%*** in HIT)
  - Provincial excellent graduates (***Top 5%*** in HIT)
  - Provincial Triple-A Student Pacesetter (***Top 3%*** in HIT)
  - Outstanding League Member (***Top 10%*** in HIT)

Publications

- [1] **Yao Mu**, Baiyu Peng, et al.. "Mixed reinforcement learning for efficient policy optimization in stochastic environments." 2020 20th International Conference on Control, Automation and Systems (ICCAS). IEEE, 2020. (**Student Best Paper Award**) .
- [2] **Yao Mu**, Yuzheng Zhuang, et al. "Model-Based Reinforcement Learning via Imagination with Derived Memory." Advances in Neural Information Processing Systems 34 (**NeurIPS2021**).
- [3] **Yao Mu**, Shoufa Chen, et al. "CtrlFormer: Learning Transferable State Representation for Visual Control via Transformer ." International Conference on Machine Learning (**ICML 2022**) .
- [4] **Yao Mu**, Yuzheng Zhuang, et al. "DOMINO: Decomposed Mutual Information Optimization for Generalized Context in Meta-Reinforcement Learning." Advances in Neural Information Processing Systems 35 (**NeurIPS2022**).
- [5] Zeyu Gao*, **Yao Mu***(**co-first author**), et al. "SEM2: Enhance Sample Efficiency and Robustness of End-to-end Urban Autonomous Driving via Semantic Masked World Model." Advances in Neural Information Processing Systems 35 (**NeurIPS2022** Deep RL workshop).
- [6] Yao Lai, **Yao Mu**, et al. "MaskPlace: Fast Chip Placement via Reinforced Visual Representation Learning." Advances in Neural Information Processing Systems 35 (**NeurIPS2022**).
- [7] Xiaoyu Chen, **Yao Mu**, et al. "Flow-based Recurrent Belief State Learning for POMDPs." International Conference on Machine Learning (**ICML 2022**).
- [8] Qiushan Guo, **Yao Mu**, et al. "Scale-Equivalent Distillation for Semi-Supervised Object Detection." Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition.(**CVPR2022**).
- [9] Zhecheng Yuan, Guozheng Ma, **Yao Mu**, et al. "Don't Touch What Matters: Task-Aware Lipschitz Data Augmentationfor Visual Reinforcement Learning." **IJCAI2022**: 3702-3708

- [10] Baiyu Peng, **Yao Mu**, et al. "Model-based actor-critic with chance constraint for stochastic system." 2021 60th IEEE Conference on Decision and Control (**CDC)**. IEEE, 2021.
- [11] Baiyu Peng, **Yao Mu**, et al. "Separated proportional-integral lagrangian for chance constrained reinforcement learning." 2021 IEEE Intelligent Vehicles Symposium (IV). IEEE, 2021. (**Finalists for the Best Student Paper Award**)
- [12] Baiyu Peng, **Yao Mu**, et al. "Model-based Chance-Constrained Reinforcement Learning via Separated Proportional-Integral Lagrangian." IEEE Transactions on Neural Networks and Learning Systems(**IEEE TNNLS, Impact Factor: 10.451**).
- [13] Yuhang Zhang, **Yao Mu**, et al. "Steadily Learn to Drive with Virtual Memory." 2022 11th Asia-Pacific Regional Conference of the ISTVS (ISTVS 2022).
- [14] Dafeng Chi, Yuzheng zhuang, **Yao Mu**, et al. "Offline-to-online Co-evolutional User Simulator and DIALOGUE System." The Sere TOD workshop on the 2022 Conference on Empirical Methods in Natural Language Processing (**EMNLP 2022** Sere TOD workshop).
- [15] Yifu Yuan, Jianye Hao, Fei Ni, **Yao Mu**, et al. "EUCLID: Towards Efficient Unsupervised Reinforcement Learning with Multi-choice Dynamics Model. Advances in Neural Information Processing Systems 35 (**NeurIPS2022** Deep RL workshop).

Research/Work Experience

- **Huawei Noah's Ark Lab** Beijing, China
  Research Internship in Reinforcement learning *May. 2020 - June. 2021*
  - **Huawei Noah's Ark Lab**: The Noah's Ark Lab is the AI research center for Huawei Technologies. The lab's mission is to make significant contributions to both the company and society by innovating in artificial intelligence, data mining, and related fields.
  - **Work Duty**: Inspired by a neuroscience experiment of "forming artificial memories during sleep," an Imagining from derived memory (IDM) algorithm under a novel actor-critic framework to improve the sample efficiency and the policy robustness of MBRL. Various experiments on high-dimensional visual control tasks with arbitrary image uncertainty demonstrate that IDM outperforms existing approaches in terms of data-efficiency, robustness to uncertainty, and final performance. **This research work is accepted by NeurIPS 2021**.

- **Sensetime** China
  Research Internship in Computer vision
  - **Sensetime AI Research Center**: SenseTime is a leading global company focused on developing AI technologies that advance the world's economies, society and humanity for a better tomorrow. It is also the world's most-funded AI pure-play with the highest valuation.
  - **Work Duty**: Mainly responsible for the research of interpretable feature extraction, we extracted explainable features such as object position, material characteristics, light source position, light source type in the picture. For rendering the image realistically, we used a physical rendering engine as the simulator. We designed an MDP process for the feature inference and used a physical rendering engine as the simulator for realistic rendering performance. The optimal interpretable feature is inferred by reinforcement learning due to its non-differentiability.

- **ForwardX Robotics** China
  Research Internship in Reinforcement learning
  - **ForwardX**: ForwardX Robotics is the world's only developer of intelligent robotics to realize wide-scale commercial deployment of vision-first Autonomous Mobile Robots (AMRs) across a number of industries, such as logistics, manufacturing, and retail. Headquartered in Beijing, China, ForwardX has domestic locations in Shanghai and Shenzhen and a North American base in Phoenix, Arizona.
  - **Work Duty**: Mainly realized the structure design, parameter optimization, and landing of Target-driven Visual Navigation in Indoor Scenes using Deep Reinforcement Learning algorithm.

Leadership Experience/Activities

- **Department science and technology innovation centre in HIT** China
  Chairman *Nov. 2017 - Sep. 2018*
  - Organized large-scale scientific and technological innovation competitions
  - Organized technical training activities to build a bridge to scientific research for junior students.
  - Elected as excellent student cadres (3/100 among all the student cadres)
- **The university's learning promotion centre** China
  The founder and the first chairmen *May. 2016 - Nov. 2017*
  - Provided students with a multimedia seminar room for academic discussion.
  - Organized a number of activities on professional knowledge, literature research, overseas study experience exchange.
- **The 2017 United Nations Global Innovation camp for sustainable development** China
  Team leader *Aug. 2017*
  - Cooperated with the students from Harvard University, Switzerland, the University of Edinburgh in the UK and other internationally renowned universities.
  - Using advanced methods and cutting-edge technologies to provide practical solutions and solutions for sustainable development goals jointly.
- **Didi international summer camp** China
  Team leader *Sep. 2019*
  - Participated in the academic seminar on intelligent transportation and the hacker marathon sponsored by Didi Chuxing with teachers and students from the University of Sao Paulo.
  - Designed new functions of taxi service software for the disabled.

Skills

- **Programming**: Python(Expert), Pytorch(Expert), C++(Intermediate), TensorFlow(Intermediate)
- **Softwares**: Linux, Git, ROS, Pycharm, Visual Studio, Microsoft Office
- **Github**: https://github.com/YaoMarkMu

Contact

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