Haoran He

bz-fore-hhr@sjtu.edu.cn · (+86) 135-2494-6726 · Haoran He

Education

Shanghai Jiao Tong University (SJTU), Shanghai, China 2019.9 – 2023.6

Undergraduate student in Computer Science (CS)

Hong Kong University of Science and Technology, Hong Kong 2024.2 – Present

Ph.D. student in Electronic and Computer Engineering

Interests

I am a first-year Ph.D. student at Hong Kong University of Science and Technology, advised by Prof. Ling Pan. I received my bachelor Degree at Shanghai Jiao Tong University in June 2023, advised by Prof. Weinan Zhang and Prof. Yong Yu.
My goal is to develop an intelligent decision-making system that possesses optimality, generalizability, interpretability and robustness. To achieve this, I primarily focus on:

- Generalist Reinforcement Learning and its application in the real world.
- Scalability and sample efficiency in Reinforcement Learning.
- Effective planning with Large Language Models (LLMs).

Publications

- Diffusion Model is an Effective Planner and Data Synthesizer for Multi-Task Reinforcement Learning
  Haoran He, Chenjia Bai, Kang Xu, Zhuoran Yang, Weinan Zhang, Dong Wang, Bin Zhao, Xuelong Li.
  NeurIPS 2023

- Robust Quadrupedal Locomotion via Risk-Averse Policy Learning Jiyuan Shi, Chenjia Bai, **Haoran He**, Lei Han, Dong Wang, Bin Zhao, Xiu Li, Xuelong Li.
  ICRA 2024

- Large-Scale Actionless Video Pre-Training via Discrete Diffusion for Efficient Policy Learning **Haoran He**, Chenjia Bai, Ling Pan, Weinan Zhang, Bin Zhao, Xuelong Li.
  preprint (under review in ICML 2024)

- Privileged Knowledge Distillation for Sim-to-Real Policy Generalization **Haoran He**, Chenjia Bai, Hang Lai, LingXiao Wang, Weinan Zhang.
  preprint, 2023

- Diffusion Models for Reinforcement Learning: A Survey Zhengbang Zhu, Hanye Zhao, **Haoran He**, Yichao Zhong, Shenyu Zhang, Haoquan Guo, Tingting Chen, Weinan Zhang.
  preprint (under review in IJCAI 2024)

- On the Value of Myopic Behavior in Policy Reuse
  Kang Xu, Chenjia Bai, Shuang Qiu, **Haoran He**, Bin Zhao, Zhen Wang, Wei Li, Xuelong Li.
  preprint (under review in TPAMI 2024)

- Regularized Conditional Diffusion Model for Multi-Task Preference Alignment
  Xudong Yu, Chenjia Bai, **Haoran He**, Changhong Wang, Xuelong Li.
  preprint (under review in ICML 2024)

Experience

Intern at Shanghai AI Lab Oct. 2022 – Feb. 2024

Role: Member of the RL group

Brief introduction: Research on generalist reinforcement learning and robotics. Advised by Dr. Chenjia Bai

- Aims to master quadruped locomotion task via a novel RL method. Adversarial methods for domain adaptation(e.g. sim2real) and skill discovery for performance boosting are proven to be effective.

- Learn a single policy that can tackle multiple tasks from the collected offline data.
- Proposed a new model named MTDIFF, which is trained on large-scale datasets for multi-task decision-making.
- Proposed a new model named VPDD, which is a generalist video-based multi-task agent pre-trained on large-scale human videos.

Sim2Real Project Feb. 2022 – Feb. 2023

Role: Member of the group

Brief introduction: Close the sim-to-real gap and accomplish more efficient policy transfer. Advised by Prof. Weinan Zhang.

- Investigated popular methods and theories in the sim2real field
- Found an efficient way to exploit simulation-based training in real-world settings.
- Proposed a new method named **HIB** which can distill privileged knowledge and boost agent's generalization ability effectively. Accomplished a paper which is under-review now.

Anti-poaching Project Sep. 2021 – Mar. 2022

Role: Individual Projects, Project Principal

Brief introduction: Take advantage of limited data to predict areas with a high risk of poaching. Collaborated with WWF and National Nature Reserves, and advised by prof. Fei Fang from CMU.

- Investigated popular methods and theories in this field
- Designed a new network inspired by meta-learning and GNN
- Exploring some exciting features of the results produced by transfer learning

ML in real-time rendering Project Oct. 2021 – Jan. 2022

Role: Project Principal

Brief introduction: Design a new light-weighted network to predict illumination in less time and with guaranteed accuracy. Advised by prof. Bin Sheng and prof. Ran Yi from SJTU.

- Investigated popular networks in this field
- Designed a new network named bi-cgan, which combines cGAN and BCNN networks.
- Proved **bi-cgan** can get better performance in robustness and efficiency.

Linux System Project Mar. 2021 – Jun. 2021

Brief introduction: Optimize process management in Linux system. Advised by prof. Fan Wu from SJTU.

- Learned shell scripts and Linux kernel
- Designed a new Weighted Round Robin scheduling methods and it performs better than traditional methods

PRP(Participation in Research Program) Project Sep. 2020 – Mar. 2021

Role: Header of the whole team

Brief introduction: Explore the interpretability of machine learning and the relationship between information theory and machine learning. Advised by Prof. Fan Cheng from SJTU.

- Learned basis of information theory and popular methods of ML
- Implemented a large number of CV experiments to explore the influence of information entropy, mutual information and so on.

Intern in robocup team of SJTU Sep. 2019 – Feb. 2020

Brief introduction: Study Machine Debugging and Software Simulation and prepare for the contest.

- Learned basis of Signals and Control Systems
- Wrote quantity of scripts
- Deployed new aggressive and defensive algorithms on robots, and then recorded effects.

SKILLS

- Programming Languages: C == C++ == Python > Rust
- Platform: Linux or Windows

- Tools: git for code management and ArcGis for geographic information system; Pytorch and Tensorflow for conducting machine learning experiments and designing neural networks
- Development: Machine learning, Reinforcement Learning, Data Analysis

♡ Honors and Awards

1st Prize in school robocup competition	2019
Merit Student in SJTU	2020
Cosco shipping scholarship	2020
Honorable Mention in Mathematical Contest In Modeling	2020
C-class Excellent Scholarship	2021
Merit Student in SJTU	2022
B-class Excellent Scholarship	2022
PostGraduate Scholarship	2024

i Miscellaneous

- GitHub: `https://github.com/tinnerhrhe`
- personal page: `https://tinnerhrhe.github.io`
- Languages: English - Fluent, Mandarin - Native speaker
- Hobbies: Running, playing ping pong, and reading.