He (Rivers) Jiang

| (+1) 412-738-9928 | hej2@andrew.cmu.edu | DiligentPanda (github) |

Education

Carnegie Mellon University Sept. 2023 - Now
Master of Science in Robotics *Pittsburgh, U.S.*
- Advisor: Prof. Jiaoyang Li.

Tsinghua University Sept. 2017 - Jun. 2020
Master's in Control Science and Engineering *Beijing, China*
- Advisor: Prof. Xiangyang Ji. Core GPA: 3.94/4.0, GPA Ranking: 1/64.

Shanghai Jiao Tong University Sept. 2013 - Jun. 2017
B.E. in Computer Science, Special Class in Engineering Management *Shanghai, China*
- Advisor: Prof. Cewu Lu. Core GPA: 3.92/4.3, GPA Ranking: 6/135.

Research Experience

Multi-Agent Path Finding (MAPF) Execution under Unexpected Delays Apr. 2024 - Now
Advisor: Prof. Jiaoyang Li. *Carnegie Mellon University*
- Proposed several techniques to speed up the search of a minimum-cost temporal plan graph (TPG), which can ensure collision- and deadlock-free execution of a MAPF solution under unexpected delays. These techniques include better cost-to-go estimation, decision variable grouping, branch prioritization, and incremental algorithm implementation.
- Provided theoretical proofs and simulation experiments to validate the effectiveness of proposed techniques. The final algorithm achieves a 30-fold speedup compared to the baseline algorithm.

Large-Scale Lifelong Multi-Agent Path Finding Sept. 2023 - Now
Advisor: Prof. Jiaoyang Li. *Carnegie Mellon University*
- Developed a multi-agent path planning system that can handle up to $10,000$ agents in scenarios like smart warehouses and autonomous vehicles with limited 1-second planning time for each timestep. The solution won the 2023 League of Robot Runners, an international competition sponsored by Amazon.
- Incorporated neural networks into our winning solution to compress the time-consuming anytime search procedure by imitation learning so that the system can exploit GPUs and have both Type-1 and Type-2 thinking.

Multi-Agent Reinforcement Learning on Google Research Football Apr. 2022 - Sept. 2022
Advisor: Prof. Jun Wang. *University College London*
- Developed an async and distributed learning framework based on Ray for policy-based cooperative MARL and self-play-based competitive MARL, such as Multi-Agent PPO and Policy Space Response Oracles (PSRO).
- Implemented a visualizable debugger and several analytic tools for the complex training procedure.

Image Captioning with Scene Graphs (Patent, CN111612070A) Sept. 2019 - Mar. 2020
Advisor: Prof. Xiangyang Ji. *Tsinghua University*
- Cleaned dataset annotations and reproduced classical models of scene graph generation.
- Exploited scene graphs as intermediate representation and attention-based contextual module to generate image captions and outperformed the baseline by 1.5%.

3D X-ray Object Detection (Patent, CN111914774A) Feb. 2018 - Oct. 2018
Advisor: Prof. Li Zhang, Prof. Xiangyang Ji. *Nuctech Company Limited*
- Cleaned, stored and organized the 3D X-ray image dataset.
- Built a detection model directly working on 3D volume data by 3D sparse convolution, U-net, and YOLO, outperforming by 33.5 mAP the original commercial-version model based on 2D Multi-view images.

Publication

- **He Jiang***, Yutong Wang*, Rishi Veerapaneni, Tanishq Duhan, Guillaume Sartoretti, Jiaoyang Li. Deploying Ten Thousand Robots: Scalable Imitation Learning for Lifelong Multi-Agent Path Finding. *** means equal contributions. Submitted** to **The International Conference on Robotics & Automation (ICRA)**, 2025.
- **He Jiang**, Muhan Lin, Jiaoyang Li. Speedup Techniques for Switchable Temporal Plan Graph Optimization. **Submitted** to **The AAAI Conference on Artificial Intelligence (AAAI)**, 2025.
- Hongzhi Zang, Yulun Zhang, **He Jiang**, Zhe Chen, Daniel Harabor, Peter J. Stuckey, Jiaoyang Li. Online Guidance Graph Optimization for Lifelong Multi-Agent Path Finding. **Submitted** to **The AAAI Conference on Artificial Intelligence (AAAI)**, 2025.
- **He Jiang**, Yulun Zhang, Rishi Veerapaneni, Jiaoyang Li. Scaling Lifelong Multi-Agent Path Finding to More Realistic Settings: Research Challenges and Opportunities. Accepted by **The Symposium on Combinatorial Search (SoCS)**, 2024.
- Yulun Zhang, **He Jiang**, Varun Bhatt, Stefanos Nikolaidis, Jiaoyang Li. Guidance Graph Optimization for Lifelong Multi-Agent Path Finding. Accepted by **International Joint Conference on Artificial Intelligence (IJCAI)**, 2024.
- Yan Song*, **He Jiang***, Haifeng Zhang, Zheng Tian, Weinan Zhang, Jun Wang. Boosting Studies of Multi-Agent Reinforcement Learning on Google Research Football Environment: the Past, Present, and Future. *** means equal contributions.** Accepted by **Autonomous Agents and Multiagent Systems (AAMAS)**, 2024.
- Yan Song*, **He Jiang***, Zheng Tian, Haifeng Zhang, Yingping Zhang, Jiangcheng Zhu, Zonghong Dai, Weinan Zhang, Jun Wang. An Empirical Study on Google Research Football Multi-Agent Scenarios. *** means equal contributions.** Accepted by **Machine Intelligence Research (MIR)**, 2023.

Professional Experience

The Organization Department of Hangzhou High-Tech Zone (Binjiang) Jul. 2020 - Apr. 2022
Administrative Staff in Charge of Information System Development and Management *Hangzhou, China*

- Led the development of an intelligent work management system, which involves more than 50 departments or sections and runs on different platforms, including PC, smartphones, and large-screen monitors.

Microsoft Research Asia Oct. 2018 - Mar. 2019
Research Intern advised by Dr.Yan Lu. Topic: Online Video Segmentation. *Beijing, China*

- Proposed an online mask propagation module and improved the performance of the single-frame model by 5%.

Competition

The League of Robot Runners Competition Dec. 2023
Lifelong Multi-Agent Path Planning: The 1st place in the overall best track.

- Implemented an asynchronous parallel Large-Neighborhood-Search-based Algorithm to plan paths for up to 10000 agents in various kinds of maps, such as warehouse, city and game maps.

Tencent Advertising Algorithm Competition Jun. 2018
Click-through Rate Prediction. Ranking: 3/1500+.

- Implemented a pytorch-based lib with C/CUDA for graph neural network learning.
- Implemented a neural network for advertisement recommendation based on ideas from a Field-aware Factorization Machine (matrix factorization) and Deep Interest Network (attention mechanism).

Award

Outstanding Undergraduate Award (Shanghai) (Top1% among all graduations) Jun. 2017
Xin Dong Enterprise Special Scholarship (Top3%) Apr. 2016
National Scholarship (Top2%) Nov. 2014
Academic Excellence Scholarship Dec. 2016, Dec. 2015, Dec. 2014

Skill

- Python, C/C++, Pytorch (Proficient)
- Parallel computing with Ray, Open MPI and CUDA (Only experience in projects)
- Deep-learning-based Computer Vision, (Multi-Agent) Reinforcement Learning, Search and Planning