Yutong Wang

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PROFESSIONAL SUMMARY

Research interests encompass Multi-Agent Reinforcement Learning (MARL), Multi-Agent Path Finding (MAPF), and Communication Learning within the MARL framework. Current research is focusing on integrating search-based MAPF algorithms with MARL to address large-scale, complex MAPF problems and their variations. The goal is to devise fundamental algorithms that balance computational efficiency with solution quality, and to deploy them on physical robots. Such problems are commonly encountered in fields such as warehouse logistics, manufacturing, and search-and-rescue.

EDUCATION

Carnegie Mellon University   Pittsburgh, United States
Visiting Student   January 2024-present
- Department: Robotics Institute   Advisor: Prof. Jiaoyang LI

National University of Singapore   Singapore
Doctor of Philosophy   August 2021-present
- Major: Mechanical Engineering   Advisor: Prof. Guillaume Sartoretti   GPA: 4.0/5.0

National University of Singapore   Singapore
Master of Science   August 2020-July 2021
- Major: Mechanical Engineering   Advisor: Prof. Guillaume Sartoretti   GPA: 4.0/5.0

Shanghai University   Shanghai, China
Bachelor of Science   September 2016-June 2020
- Major: Electrical Engineering and Automation   Advisor: Prof. Peter Chen   GPA: 3.16/4.00

PUBLICATIONS

Chengyang He, Tianze Yang, Tanishq Duhan, **Yutong Wang**, Guillaume Sartoretti; "ALPHA: Attention-based Long-horizon Pathfinding in Highly-structured Areas", accepted by 2024 International Conference on Robotics and Automation (ICRA 2024).

Yutong Wang, Bairan Xiang, Shinan Huang, Guillaume Sartoretti; "SCRIMP: Scalable Communication for Reinforcement- and Imitation-Learning-Based Multi-Agent Pathfinding"; accepted by 2023 International Conference on Autonomous Agents and Multiagent Systems as an extension abstract (AAMAS 2023) and 2023 International Conference on Intelligent Robots and Systems as a full paper (IROS 2023).

Yizhuo Wang, **Yutong Wang**, Yuhong Cao, Guillaume Sartoretti; "Spatio-Temporal Attention Network for Persistent Monitoring of Multiple Mobile Targets"; accepted by 2023 International Conference on Intelligent Robots and Systems (IROS 2023).

Yutong Wang, Yizhuo Wang, Guillaume Sartoretti; "Full Communication Memory Networks for Team-Level Cooperation Learning"; accepted by Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS).

Yutong Wang, Mehul Damani, Pamela Wang, Yuhong Cao, Guillaume Sartoretti; "Distributed Reinforcement Learning for Robot Teams: A Review"; accepted by Current Robotics Reports.

Yutong Wang, Guillaume Sartoretti; "FCMNet: Full Communication Memory Net for Team-Level Cooperation in Multi-Agent

Systems"; accepted by 2022 International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2022).

INTERNSHIP AND WORK EXPERIENCE

National University of Singapore September 2021- December 2023
Position: Research Engineer

DENSO Shanghai Technology Center August 2019-September 2019
Position: Intern Hardware Engineer

Ongoing Projects

Hybrid adaptive replanning in Large Neighborhood Search April 2023-present
In this project, we combined MAPF-LNS2 and a MARL-based planner to introduce a new algorithm called LNS2-MARL. The overall framework of LNS2-MARL follows that of MAPF-LNS2, which updates the overall solution using re-planned paths. However, during the challenging early stages of iterative planning, it replaces the original re-planning planner with a MARL-based planner to enhance solution quality, albeit at a slower speed. Ultimately, it adaptively switches back to the original priority-based planner to swiftly resolve remaining collisions, thus achieving a balance between solution quality and speed.

Solving Lifelong MAPF via MARL January 2024-present
In this project, we alternately train a MARL-based planner and traffic rules based on map structure to mitigate the shortsightedness of LMAPF planners and thereby improve throughput. Moreover, we use PIBT to resolve collisions generated by the MARL-planner and achieve faster computation speeds than those of RHCR-related algorithms through the real-time action characteristics of MARL-planner.

Dynamic Agent Selection for Lifelong MAPF via RL March 2024-present
Recent research suggests that the performance of RHCR-related algorithms can be enhanced by selectively disabling some agents in each Windowed MAPF instance based on predefined conditions. In this project, our goal is to explore how to select these disabled agents automatically and intelligently, considering both the map's structure and the expected future actions of other agents. By doing so, the traffic congestion in high-density LMAPF tasks can be alleviated accordingly.

AWARDS

Toyo-Denso Special Scholarship for Academic Excellent (3/200), Shanghai University April 2020

REVIEWER

2023 IEEE International Conference on Robotics and Automation (ICRA 2023)
2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2024)
Scientific Reports

SKILLS

Language: Native in Chinese; Fluent in English
Programming Languages: Python, C++, Matlab
Software & Tools: Linus, ROS2, AutoCAD, Multisim, Git, LATAX, Jupyter, Pycharm, Visual Studio Code, Clion, Tensorflow, Pytorch, Keras, Scikit-Learn, OpenCV