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RESEARCH INTERESTS

Reinforcement Learning; Learning Theory; Game Theory; Optimization and Control; Large Language Model in Decision-Making

PROJECT EXPERIENCES

Combining model-based & model-free reinforcement learning. 09/2020-Now

Project Organizer & Corresponding Author

We developed two algorithms that leverage gradient information from an estimated model to accelerate model-free training. The experiments were conducted on an additive nonlinear system with a linear estimated model and in the mujoco environment with a Gaussian estimated model. The results show the SOTA performance and have been published in *LADC* and under review for *AAAI* and *ICLR*.

AI agent that can effectively collaboration with human 11/2021-2024/05

Project Organizer & Corresponding Author

We utilize stochastic game theory and Stackelberg game formulation. In our setting, human agents are not assumed to be rational, and their utility functions are unknown. Based on these constraints, we develop two algorithms: one for Stackelberg games and another for stochastic games, both designed to facilitate AI-human collaboration. Experiments are conducted in the Overcooked-AI environment. The results have been published in the *ACC* and the *AAMAS*. Additionally, two papers extending this formulation to partial observations are available as open-access preprints and are currently under review.

LLM for end-to-end autonomous driving 05/2024-Now

Coauthor

Developed a hybrid system that leverages a large language model (LLM) to provide high-level instructions at low frequency, enhancing the generalization capability of a high-frequency onboard controller running on an iPhone for autonomous driving. This design mitigates the high-latency challenges of LLMs, making our experiments the first real-world implementation of LLMs in this context. The results have been published in the *CORL*. Ongoing research has been submitted to *CVPR* and is currently under review.

EDUCATION

Ph.D. in Department of Electrical and Computer Engineering

06/2025

University of Illinois Chicago, Chicago, IL

Advisor: Shuo Han

Thesis: *TBD*

Bachelor in Department of Mathematics

07/2020

Southern University of Science and Technology, Shenzhen, China

PUBLICATIONS

∗: Corresponding author. †: equal contribution

Preprints

- [1] Yansong Li^{∗†}, Zeyu Dong[†], Ertai Luo, Yu Wu, Shuo Wu, and Shuo Han, *When to trust your data: Enhancing dyna-style model-based reinforcement learning with data filter*, 2024. arXiv: 2410.12160 [cs.LG].
- [2] Yansong Li^{∗†}, Zeyu Dong[†], and Shuo Han, “Bayes-Optimal, Robust, and Distributionally Robust Policies for Uncertain MDPs,” *preprint*, Oct. 2024. DOI: 10.25417/uic.27138990.v1.
- [3] Yansong Li[∗], Zeyu Dong, and Shuo Han, “Removing Redundant Partner Policies May Be Unnecessary for Ad Hoc Teamwork,” *preprint*, Oct. 2024. DOI: 10.25417/uic.27139116.v1.

Peer-Reviewed Conference Publications

- [1] Zeyu Dong, Yimin Zhu, Yansong Li, Kevin Mahon, and Yu Sun[∗], “Generalizing end-to-end autonomous driving in real-world environments using zero-shot LLMs,” in *8th Annual Conference on Robot Learning*, 2024.
- [2] Yansong Li[∗] and Shuo Han, “Efficient collaboration with unknown agents: Ignoring similar agents without checking similarity,” in *Proceedings of the 23rd International Conference on Autonomous Agents and Multiagent Systems, AAMAS 2024, Auckland, New Zealand, May 6-10, 2024*, Mehdi Dastani, Jaime Simão Sichman, Natasha Alechina, and Virginia Dignum, Eds., International Foundation for Autonomous Agents and Multiagent Systems / ACM, 2024, pp. 2363–2365. DOI: 10.5555/3635637.3663161.
- [3] Yansong Li[∗] and Shuo Han, “Solving strongly convex and smooth stackelberg games without modeling the follower,” in *American Control Conference, ACC 2023, San Diego, CA, USA, May 31 - June 2, 2023*, IEEE, 2023, pp. 2332–2337. DOI: 10.23919/ACC55779.2023.10156010.
- [4] Yansong Li[∗] and Shuo Han, “Accelerating model-free policy optimization using model-based gradient: A composite optimization perspective,” in *Learning for Dynamics and Control Conference, LADC 2022, 23-24 June 2022, Stanford University, Stanford, CA, USA*, Roya Firoozi, Negar Mehr, Esen Yel, Rika Antonova, Jeannette Bohg, Mac Schwager, and Mykel J. Kochenderfer, Eds., ser. Proceedings of Machine Learning Research, vol. 168, PMLR, 2022, pp. 304–315.

CONTRIBUTIONS TO OPEN SOURCE PROJECTS

1. Contributor to TeXmacs/Mogan: A WYSIWYG editor that can type equations 10 times faster than \LaTeX . See “A quick tour of TeXmacs” for a 3 mins short introduction.

2. Main Developer of Goldfish Scheme: A Scheme compiler based on S7 Scheme and C++. This compiler matches the speed and simplicity of S7 Scheme while offering improved support for the Microsoft Windows system. In Goldfish Scheme, we have implemented the complete set of features from R7RS and included many functionalities inspired by the Python standard library. Goldfish Scheme will be the foundation for TeXmacs/Mogan in the future.

TEACHING EXPERIENCE

Southern University of Science and Technology:
MA213-16 Calculus I (Tutorial, Fall 2020)
MA101B Mathematical Analysis (Tutorial, Spring 2019)

RESEARCH INTERN

LLM in End-To-End Autonomous Driving 05/2025-08/2025
Stony Brook University
Advisor: Dantong Yu
CORL has accepted our work as a conference paper

Learning to Help in Multi-Class Classifications and Markov Decision Processes 08/2025-Now
Advisor: Anand D. Sarwate
Rutgers University
Under review

PROFESSIONAL SERVICE

Reviewer

Conferences
International Conference on Learning Representations (ICLR)
IEEE Conference on Decision and Control (CDC)
International Conference on Identification, Information and Knowledge in the Internet of Things (IIKI)

INVITED TALKS

1. "Bayes-Optimal, Robust, and Distributionally Robust Policies for Uncertain MDPs", RINGS informal seminar, Rutgers University-New Brunswick, 08/2024.
2. "Efficient Collaboration with Unknown Agents: Ignoring Similar Agents without Checking Similarity", Digital Economy Lecture, Beijing Normal University & Hong Kong Baptist University United International College, 10/2023.
3. "Solving Strongly Convex and Smooth Stackelberg Games Without Modeling the Follower", 2023 American Control Conference, San Diego, 06/2023.