



HKUCS Seminar on

Towards Efficient and Adaptive RL Algorithms in Dynamic and Multi-Agent Environments

Date and Time: Oct 10, 01:30 pm-02:30 pm

Venue: CB 328

Shuai Li

Associate Professor
Shanghai Jiao Tong University



Abstract:

Reinforcement Learning (RL) in dynamic and multi-agent environments poses critical theoretical and practical challenges. These include (i) the difficulty of decomposing complex structured actions, (ii) robust convergence across diverse and non-stationary scenarios, and (iii) balancing individual learning dynamics with multi-agent game-theoretic interactions. This talk presents a unified framework addressing these challenges through (a) integrating decomposable action structures into agent learning, (b) leveraging statistical optimization techniques for automatic adaptation to environmental variations, and (c) designing equilibrium-aware algorithms for balancing multi-agent learning and strategic interactions.

I will highlight key theoretical contributions from my group, including optimal regret bounds and robust convergence guarantees under complex function approximations. These results, published in top venues such as SODA, COLT, and ICML, have established several state-of-the-art benchmarks. I will also share successful real-world applications: achieving a bronze medal in the International SAT Competition with Huawei's EDA parallel solver, reducing A/B testing durations by 10% in Tencent's WeChat experimentation platform, and lowering privilege restriction rates by 69% (from 6.36 to 1.96 per 1,000) with the same level of risk control capability in Ant Group's Risk Management Platform.

Looking forward, I will outline new directions for developing scalable RL theories and algorithms under dynamic environments with complex function approximation and multi-agent Markov games.

About the Speaker:

Shuai Li is an Associate Professor at the AI School of Shanghai Jiao Tong University and Deputy Director of the John Hopcroft Center for Computer Science. Her research focuses on reinforcement learning theory and algorithms for autonomous decision-making in dynamic environments, as well as the analysis of diffusion and large language models. She serves as Area Chair or Senior PC member for leading conferences such as ICML, NeurIPS, ICLR, ACL, AISTATS, IJCAI, AAMAS, and UAI. She has received the AAAI-IAAI Deployed Application Award, Shanghai Rising Talent, Shanghai Xuhui Guangqi Talent, Google PhD Fellowship, Huawei Spark Award, Tencent Outstanding Mentor Award, and international recognition in the SAT Competition. Prof. Li's algorithms have been successfully deployed in large-scale industrial systems, significantly improving performance and efficiency.