



Department of Computer Science

Intelligent Planning for Large-Scale Multi-Agent Coordination

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Hosted by Pan Xu

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Seminar: 2:30 PM – 3:30 PM

WebEx: <https://njit.webex.com/njit/j.php?MTID=m8c76d53fc42b2b403a87616983cc31ed>

<https://cs.njit.edu/seminars>

Abstract:

There is no doubt that robots will play a crucial role in the future and need to work as a team in increasingly more complex applications. Advances in robotics have laid the hardware foundations for building large-scale multi-robot systems, such as for mobile robots and drones. But how to coordinate robots intelligently is a difficult problem: Exact methods, such as integer programming and A^* , do not scale as the joint-state space increases exponentially with the number of robots, while heuristic methods, such as reactive methods and end-to-end learning, may lead to deadlocks or traffic congestion.

In this talk, I will introduce intelligent planning algorithms for solving this challenge with a focus on one fundamental problem: letting a large team of agents navigate without collisions in congested environments while minimizing their travel times. I will present principled planning algorithms that can efficiently coordinate hundreds of agents while providing rigorous guarantees on completeness and even optimality. I will also present techniques to apply these algorithms to real-world problems with robustness guarantees, such as warehouse robot coordination, multi-robot motion planning, railway planning, and airport surface operation.

Bio:

Jiaoyang Li is a Ph.D. candidate in the Department of Computer Science at the University of Southern California (USC). Her research lies in the intersection of artificial intelligence, robotics, and optimization, with a focus on coordinating large teams of autonomous agents to accomplish collaborative tasks intelligently. She has published her research at top venues for AI planning and multi-agent systems (such as AAAI, IJCAI, ICAPS, and AAMAS) and received press coverage for it. She has also received a Technology Commercialization Award from the USC Stevens Center for Innovation in 2018, an Outstanding Student Paper Award from ICAPS'20, a Best System Demonstration Award from ICAPS'21, and a Best Research Assistant Award from USC in 2021. She recently led a team that won the NeurIPS'20 Flatland Challenge on railway planning and was selected to participate in Rising Stars in EECS 2021. More information can be found on her [webpage https://jiaoyangli.me/](https://jiaoyangli.me/).