Multidisciplinary Simulation, Estimation, and Assimilation Systems

Seminar Series

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Scalable Multiagent Coordination in Noisy, Uncertain Environments

Abstract: As agents are built for more complex environments, engineering high quality solutions by hand becomes very difficult and methods that do not consider uncertainty will perform poorly. This is especially true when there are multiple agents interacting (e.g., routers, sensors, people, robots), which is often the case in today's connected world. Due to communication cost, latency or noise, decentralized decision-makers that do not depend on up-to-date global information are critical. The main obstacles to developing these decentralized agents are high computational complexity and the need for a full model of the problem.

In this talk, I discuss methods for automatically generate near-optimal solutions while considering uncertainty over outcomes, system information and other agents. I will survey the decentralized partially observable Markov decision process (Dec-POMDP) model that this work is based on and present recent work on bridging the gap between this theory and real-world applications. To demonstrate the effectiveness of these methods, I will show how they can be used to robustly solve a warehousing problem with a team of ground robots. These approaches have great potential to lead to automated solution methods for general multiagent coordination problems with large numbers of heterogeneous robots in complex, uncertain domains.

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12:00PM; Rm. 5-314

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