NATIONAL UNIVERSITY OF SINGAPORE School of Computing PH.D DEFENCE - PUBLIC SEMINAR

Title:	Continuous POMDPs for Robotic Tasks
Speaker:	Mr Bai Haoyu
Date/Time:	22 August 2014, Friday, 01:00 PM to 02:30 PM
Venue:	Executive Classroom, COM2-04-02
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Abstract:

Planning under uncertain and dynamic environments is an essential capability for autonomous robots. Partially observable Markov decision processes (POMDPs) provide a general framework for solving such problems and have been applied to different robot tasks such as manipulation with robot hands, self-driving car navigation, and unmanned aircraft collision avoidance. While there is dramatic progress in solving discrete POMDPs, progress on continuous POMDPs has been limited. However, it is often much more natural to model robot tasks in a continuous space.

We developed several algorithms that enable POMDP planning with continuous states, continuous observations as well as continuous unknown model parameters. These algorithms have been applied to different robot tasks such as unmanned aircraft collision avoidance and autonomous vehicle navigation. Experimental results for these robot tasks demonstrated the benefits of probabilistic planning with continuous models: continuous models are simpler to construct and provide more accurate description of the robot system; our continuous planning algorithms are general for a broad class of tasks, scale to more difficult problems and often results in improved performance comparing with discrete planning. Therefore, these algorithmic and modelling techniques are powerful tools for robotic planning under uncertainty. These tools are necessary for building more intelligent and reliable robots and would eventually lead to wider application of robotic technology.