CCSU

DEPARTMENT OF MATHEMATICAL SCIENCES

VIRTUAL COLLOQUIUM

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3:00 – 4:00 PM

https://ccsu.webex.com/meet/gotchev

GRAPH-THEORETICAL APPROACHES TO PLANNING IN ROBOTICS

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UBER

Abstract: One of the challenges in building intelligent autonomous systems and robots is planning. Those systems need to be able to quickly and efficiently calculate safe sequences of actions to execute in order to achieve their assigned tasks. In this talk, we are going to discuss the challenges of planning for complex high-dimensional systems. We will show how the problem of planning for robotic systems can be formulated as the problem of finding a least-cost path in an edge-weighted graph. We are going to present a few graph-theoretical approaches and algorithms, and how they apply to real-world robotic systems. We will also show how the problem can be solved more efficiently by utilizing domain-specific abstractions aimed at reducing the size and complexity of the graphs that need to be searched. We will present our framework for Planning with Adaptive Dimensionality, which makes effective use of state abstraction and dimensionality reduction in order to reduce the size and complexity of the state-space, and thus, ultimately speeds up planning in complex domains. We will demonstrate the application of our framework in various domains, such as navigation for unmanned aerial and ground vehicles, multi-robot collaborative navigation, manipulation and mobile manipulation, and navigation for humanoid robots.

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