北京大学
Peking University

报告地点： 工学院力学楼434
时间: 6月27日 10:00 - 11: 30

COOL RESEARCH

系列报告第十讲

报告人：高瑜隆博士（牛津大学）

报告题目：Uncertainty Propagation and Quantification for Safe Control of Linear Systems

Control, Optimization, Operations research, and Learning（COOL）Research Seminar是由北大工学院相关领域的几位老师发起，旨在为国内外青年学者提供一个交流平台，分享和探讨最新最有趣的研究成果，促进领域内和跨领域沟通学习，推动前沿理论的发展。

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Uncertainty Propagation and Quantification for Safe Control of Linear Systems

Abstract: Safety is a primary requirement for many control systems. Ensuring safety is a challenging goal, due to inevitable uncertainties. In the first part of this talk, we focus on the characterization of random return in the distributional LQR. This return cumulates the discounted quadratic cost over infinite horizon under random exogenous disturbances. We provide a closed-form expression of the random return and show that it is the fixed-point solution to the distributional Bellman equation. The new characterization is applicable to the risk-averse LQR. In the second part of the talk, we consider the model predictive control (MPC) of linear systems subject to bounded additive disturbance and hard constraints on the state and input, whereas the true disturbance set is unknown. Unlike most existing work on robust MPC, we propose an MPC algorithm incorporating online uncertainty quantification to approximate the true disturbance set at each time. We provide statistical gaps between the true and quantified disturbance sets. Several examples are given to demonstrate the efficacy of the proposed algorithm.

报告人：高瑜隆博士（牛津大学）

报告人简介: Yulong Gao is a postdoctoral researcher at the Department of Computer Science, University of Oxford. He received B.E. degree in Automation in 2013, the M.E. degree in Control Science and Engineering in 2016, both from Beijing Institute of Technology, and the joint Ph.D. degree in Electrical Engineering in 2021 from KTH Royal Institute of Technology, Sweden, and Nanyang Technological University, Singapore. Before moving to Oxford, he was a Researcher at KTH from 2021 to 2022. He was the receipt of the VR International Postdoc Grant from Swedish Research Council. His research interests include control theory, formal verification, and application to safety-critical autonomous systems.

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