THE UNIVERSITY  OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Numerical Analysis Seminar

Data-driven solvers for Hamilton-Jacobi-Bellman PDEs

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Abstract

High-dimensional Hamilton-Jacobi-Bellman PDEs naturally arise in feedback control synthesis for high-dimensional dynamics, and their numerical solution must be sought outside the framework provided by grid-based discretizations. In this talk, we discuss the construction of optimal feedback laws for high-dimensional nonlinear dynamics circumventing the direct numerical approximation of the HJB PDE. Our feedback law recovery is cast in a supervised learning framework, through the generation of a synthetic dataset from samples of the HJB solution and its gradient. This gradient-augmented formulation scales efficiently with respect to the dimension of the control system, and is complemented with sparse optimization to recover a feedback law of reduced complexity. We present different architectures for feedback recovery, including polynomial approximation, tensor decompositions, and deep neural networks.

Date:	March 2, 2022 (Wednesday)
Time:	5:00 – 6:00pm (Hong Kong Time)
Venue:	ZOOM: https://hku.zoom.us/j/
	Meeting ID: 913 6532 3891
	Password: 310656

All are welcome