THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

Tackling high dimensional challenges in scientific computing (part II)

By

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Abstract

In this mini-series of talks, we will survey some recent advances in utilizing advances in machine learning to help tackle challenging tasks in scientific computing, focusing on numerical methods for solving high dimensional partial differential equations and high dimensional sampling problems. In particular, we will discuss theoretical understandings and guarantees for such methods and new challenges arise from the perspective of numerical analysis.

In the second lecture, we will discuss numerical approach to solve high dimensional Hamilton-Jacobi-Bellman (HJB) type partial differential equations (PDEs). The HJB PDEs, reformulated as optimal control problems, are tackled by the actor-critic framework inspired by reinforcement learning, based on neural network parametrization of the value and control functions. Within the actor-critic framework, we employ a policy gradient approach to improve the control, while for the value function, we derive a variance reduced least-squares temporal difference method using stochastic calculus. We will also discuss convergence analysis for the actor-critic method, in particular the policy gradient method for solving stochastic optimal control.

Date　：**21 July 2023 (Friday)**
Time　：**10:00am – 11:00am**
Venue　：**Room 2302 (Lifts 17/18)**

All are Welcome!