



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

**Data-Driven Matrix Computations for
Kernel Methods**

By

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Abstract

Dense kernel matrices arise in a broad range of disciplines, such as potential theory, molecular biology, statistical machine learning, etc. To reduce the computational cost, low-rank or hierarchical low-rank techniques are often used to construct an economical approximation to the original matrix. In this talk, we propose data-driven approaches for accelerating dense kernel matrix computations. We first provide a straightforward geometric interpretation that answers a central question: what kind of subset is preferable for skeleton low-rank approximations. Based on the geometric findings, we present scalable and robust hierarchical algorithms for black-box dense kernel matrix computations. The efficiency and robustness will be demonstrated through experiments for various datasets, kernels, and dimensions, including benchmark comparison to the state-of-the-art packages for N-body simulations.

Date : 26 November 2026 (Thursday)

Time : 10:00a.m.-11:00a.m.

Venue : Room 3598 (near Lift 27/28)

All are Welcome!