



For Favour of posting
****Amendment**

The Hong Kong University of Science and Technology

Department of Mathematics

Seminar on Applied Mathematics
and Data Science

**Multi-Scale and Multi-Representation Learning
on Graphs and Manifolds**

by

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Abstract

The analysis of geometric (graph- and manifold-structured) data have recently gained prominence in the machine learning community. For the first part of the talk, I will introduce Lanczos network (LanczosNet), which uses the Lanczos algorithm to construct low rank approximations of the graph Laplacian for graph convolution. Relying on the tridiagonal decomposition of the Lanczos algorithm, we efficiently exploit multi-scale information via fast approximated computation of matrix power, and design learnable spectral filters. Being fully differentiable, LanczosNet facilitates both graph kernel learning as well as learning node embeddings. I will show the application of LanczosNet to citation networks and QM8 quantum chemistry dataset.

For the second part of the talk, I will introduce a novel multi-representation learning paradigm for manifolds naturally equipped with a group action. Utilizing a representation theoretic mechanism, multiple associated vector bundles can be constructed over the orbit space, providing multiple views for learning the geometry of the underlying manifold. The consistency across these associated vector bundles form a common base for unsupervised manifold learning, through the redundancy inherent to the algebraic relations across irreducible representations of the transformation group. I will demonstrate the efficacy of the proposed algorithmic paradigm through dramatically improved robust nearest neighbor search in cryo-electron microscopy image analysis.

Date: Thursday, 26 September 2019

****Time: 4:30p.m. - 5:50p.m.**

****Venue: Room 2405, Academic Building
(near Lifts 17-18), HKUST**

All are welcome!