



**The Hong Kong University of Science and Technology**

**Department of Mathematics**

**Seminar on Data Science and  
Applied Mathematics**

**Convolutional Neural Network with  
Structured Filters**

*by*

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**Abstract**

Filters in a Convolutional Neural Network (CNN) contain model parameters learned from enormous amounts of data. The properties of convolutional filters in a trained network directly affect the quality of the data representation being produced. In this talk, we introduce a framework for decomposing convolutional filters over a truncated expansion under pre-fixed bases, where the expansion coefficients are learned from data. Such a structure not only reduces the number of trainable parameters and computation load but also explicitly imposes filter regularity by bases truncation. Apart from maintaining prediction accuracy across image classification datasets, the decomposed-filter CNN also produces a stable representation with respect to input variations, which is proved under generic assumptions on the bases expansion. Joint work with Qiang Qiu, Robert Calderbank, and Guillermo Sapiro.

**Date: Friday, 1 June 2018**

**Time: 3:00p.m. – 4:00p.m.**

**Venue: Room 4475 (lift 25, 26),  
Academic Building, HKUST**

***All are welcome!***