

The Hong Kong University of Science and Technology

Department of Mathematics

Seminar on Data Science and Applied Mathematics

Convolutional Imputation of Matrix Networks By

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<u>Abstract</u>

A matrix network is a family of matrices, with their relations modeled as a weighted graph. We consider the task of completing a partially observed matrix network. The observation comes from a novel sampling scheme where a fraction of matrices might be completely unobserved. How can we recover the entire matrix network from incomplete observations? This mathematical problem arises in many applications including medical imaging and social networks. To recover the matrix network, we propose a structural assumption that the matrices are low-rank after the graph Fourier transform on the network. We formulate a convex optimization problem and prove an exact recovery guarantee for the optimization problem. Furthermore, we numerically characterize the exact recovery regime for varying rank and sampling rate and discover a new phase transition phenomenon. Then we give an iterative imputation algorithm to efficiently solve optimization problem and complete large scale matrix networks. We demonstrate the algorithm with a variety of applications such as MRI and Facebook user network.

Date: Time: Venue: Wednesday, 23 January 2019 4:00p.m. - 5:00p.m. Room 2463, Academic Building (near Lifts 25 - 26), HKUST

All are welcome!