Amendment **

The Hong Kong University of Science and Technology

Department of Mathematics

PhD THESIS EXAMINATION

Optimization Algorithms on Tensor

By

Mr. Lizhang MIAO

ABSTRACT

Tensor is multidimensional array as generalization of matrix. In this thesis, several algorithms are developed and analysed for tensor related problem, including tensor decomposition and tensor recovery. Although residing in very high-dimensional spaces, tensor of interest frequently has low-complexity structure. One of the commonly used structures is low multilinear rank. First, we investigate Tensor Robust PCA based on Tucker decomposition, which studies how to decompose a tensor into a low Tucker-rank tensor and a sparse tensor. We develop a non-convex algorithm which is both computationally efficient and theoretical guaranteed. Unlike existing algorithms which design convex relaxation of tensor rank and sparsity to solve the problem using convex optimization similar to matrix RPCA, our method update low-rank tensor and sparse tensor alternatively. And acceleration is achieved by first projecting a tensor onto low dimensional subspace before obtaining a new estimate of the low rank tensor via HOSVD. Second, we study tensor recovery problem, which is to recover a low multilinear-rank tensor from a small amount of linear measurements. Based on tensor RIP, we propose a provable Riemannian gradient algorithm and achieve near-optimal sample complexity with initialization by one step of iterative hard thresholding.

Date: 28 Feb 2020, Friday

Time: 02:00 p.m.

****ZOOM Meeting: https://hkust.zoom.us/j/6726178221**

***Thesis Examination Committee*:**

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