



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS

Recovery of Timelabels in Noisy Dynamical Data

By

Prof. Wanjie WANG

National University of Singapore

Abstract

The study of dynamical data requires information on temporal labels, such as the stages in embryo development and angles in Cyro-EM molecule dynamics. However, in these applications, temporal labelling either requires huge manpower cost or is not available. In practice, the noise in the feature space makes this problem more challenging.

Our work develops spectral algorithms to recover the temporal labels from noisy data points. We first construct the graph Laplacian of the data, and then use the Fiedler vectors to recover the temporal labels. The construction and recovery steps vary on whether the dynamical system is periodic or non-periodic. Our method does not require certain monotone properties on the similarity matrix, which are commonly assumed in existing spectral seriation algorithms.

We analyze the l_∞ error of our estimators for the temporal labels and ranking, without assumptions on the eigengap. In numerical analysis, our method outperforms spectral seriation algorithms based on a similarity matrix. The performance of our algorithms is further demonstrated on biomolecule data examples.

Date : 25 June 2024 (Tuesday)

Time : 3:00pm - 4:00pm

Venue : Room 4503 (Lifts 25/26)

All are Welcome!