

Liu Bie Ju Centre for Mathematical Sciences
City University of Hong Kong

Mathematical Analysis and its Applications Colloquium

Organized by Prof. Hui-Hui Dai and Dr. Dan Dai

Hyperplane Models for Coherent Pattern Detection in Multidimensional Data

by

Professor Hong YAN

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City University of Hong Kong

Date : 19 January, 2017 (Thursday)
Time : 4:30 pm to 5:30 pm
Venue : Room G5317
Green Zone, Level 5, Academic 1 (AC1)
City University of Hong Kong

ABSTRACT:

Multidimensional datasets can be very large in size, but they may contain much smaller meaningful patterns. In a large matrix, we can perform data classification in either feature or object direction based on traditional clustering algorithms. However, if a coherent pattern embedded in the data involves a subset of features and a subset of objects, then biclustering analysis is needed, which is often much more complicated than clustering. The problem is even more challenging if the data dimensionality is large. For example, in gene expression data, we may be interested in extracting a subset of genes that co-express under a subset of conditions at a subset of time points. In consumer data analysis, we may want to find a subset of consumers who like a subset of products in a subset of locations. In these two cases, we need to analyze three dimensional data arrays, or perform triclustering. Recently, we have discovered that a class of coherent patterns in multidimensional data can be represented as hyperplanes in singular vector spaces. By decomposing a data array into singular vector matrices, we can then deal with pattern coherence in individual directions. We have applied our coherent pattern detection algorithms successfully to genomic data analysis, disease diagnosis, drug therapeutic effect assessment, and human facial expression analysis. Our method can also be useful for many other big data analysis applications.

Light refreshments will be provided before the colloquium from 4:00 pm to 4:30 pm. Please come and join us!

**** All interested are welcome ****

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