For favour of posting

DEPARTMENT OF STATISTICS AND ACTUARIAL SCIENCE
THE UNIVERSITY OF HONG KONG

Departmental Seminar

Professor Yuichi MORI

Vice President and Professor of Data Science
Okayama University of Science
Okayama, Japan

will give a talk
entitled

NONLINEAR PRINCIPAL COMPONENT ANALYSIS AND ITS APPLICATIONS

Abstract

Principal components analysis (PCA) is a commonly used descriptive multivariate method for handling numerical data and can be extended to deal with mixed measurement level data. The extended PCA with such a mixture of categorical (nominal and ordinal) and numerical variables is referred to as nonlinear PCA. Nonlinear PCA (NLPCA) alternates between estimating the parameters of PCA and quantifying categorical data, and uses the alternating least squares (ALS) algorithm as the algorithm to find least squares solutions.

Here we show two topics on NLPCA, one is variable selection in NLPCA and the other is acceleration of ALS algorithm.

NLPCA allows us to deal with any measurement level multivariate data uniformly as numerical data. This means that all variables in the data can be analyzed as numerical variables, and we can therefore solve the variable selection problem for mixed measurement level data using any existing variable selection method such as the modified PCA, which finds a subset of numerical variables that represents all variables as far as possible. We discuss variable selection in NLPCA for mixed measurement level data using criteria in the modified PCA.

ALS algorithm may require many iterations and significant computation time to converge, because its speed of convergence is linear. In order to accelerate the convergence, we propose a new iterative algorithm using the vector epsilon algorithm to generate a faster linear convergent sequence. The numerical experiments for a large number of variables with a variety of mixing rates of categorical and numerical variables and for variable selection problem in NLPCA demonstrate that the speed of convergence of the proposed acceleration algorithm is significantly faster than that of the ordinary ALS algorithm. This is a joint work with Masahiro Kuroda, Michio Sakakihara and Masaya Iizuka.

on

Thursday, June 21, 2018

(Refreshments will be served from 10:15 a.m. outside Room 301 Run Run Shaw Building)

10:30 a.m. – 11:30 a.m.

at

Room 301, Run Run Shaw Building

Visitors Please Note that the University has limited parking space. If you are driving please call the Department at 3917 2466 for parking arrangement.

All interested are welcome