



The Chinese University of Hong Kong
Department of Statistics

Seminar

A Unified Matrix Model Including Both CCA and F Matrices in Multivariate Analysis: The Largest Eigenvalue and Its Applications

By

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Abstract

We consider a general matrix model $\Omega = (\mathbf{Z}\mathbf{U}_2\mathbf{U}_2^T\mathbf{Z}^T)^{-1}\mathbf{Z}\mathbf{U}_1\mathbf{U}_1^T\mathbf{Z}^T$, where \mathbf{U}_1 and \mathbf{U}_2 are two orthogonal isometries and \mathbf{Z} is the matrix of observed data. We establish the asymptotic Tracy-Widom distribution for the largest eigenvalue of Ω under moment assumptions on the data \mathbf{Z} . This result has wide applications in practice. For example, by appropriately choosing \mathbf{U}_1 and \mathbf{U}_2 , our results can be used in deriving the asymptotic distribution of the maximum eigenvalues of the matrices used in canonical correlation analysis (CCA) and of F matrices (including centered and non-centered versions). Moreover, via appropriate matrices \mathbf{U}_1 and \mathbf{U}_2 , our result on Ω can be applied to some multivariate testing problems that cannot be done by both types of matrices. To see this, we consider two specific examples. One is in the multivariate analysis of variance (MANOVA) approach for testing the equivalence of several high-dimensional mean vectors, where \mathbf{U}_1 and \mathbf{U}_2 are chosen to be two nonrandom matrices. The other one is in the multivariate linear model for testing the unknown parameter matrix, where \mathbf{U}_1 and \mathbf{U}_2 are random. Extensive simulation studies strongly support the theoretical results.

Date: February 27, 2018 (Tuesday)

Time: 2:30 p.m. - 3:30 p.m.

Venue: William M W Mong Engineering Building (ERB) - Room 404
The Chinese University of Hong Kong

ALL INTERESTED ARE WELCOME