

# 國立中山大學應用數學系

## 學術演講

講者：王紹宣 教授 (中央大學統計研究所)

講題：Perturbation Theory for Cross Data Matrix-based PCA

時間：2023/03/01 (Wednesday) 14:10 ~ 15:00

地點：理 SC 4009-1 教室

茶會：13:30

### Abstract

Principal component analysis (PCA) has long been a useful and important tool for dimension reduction. Cross data matrix (CDM)-based PCA is another way to estimate PCA components, through splitting data into two subsets and calculating singular value decomposition for the cross product of the corresponding covariance matrices. It has been shown that CDM-based PCA has a broader region of consistency than ordinary PCA for leading eigenvalues and eigenvectors. In this talk, I will introduce the finite sample approximation results as well as the asymptotic behavior for CDM-based PCA via matrix perturbation. Moreover, I introduce a comparison measure for CDM-based PCA vs. ordinary PCA. This measure only depends on the data dimension, noise correlations and the noise-to-signal ratio (NSR). Using this measure, we develop an algorithm, which selects good partitions and integrates results from these good partitions to form a final estimate for CDM-based PCA. Numerical and real data examples are presented for illustration. This joint work is with Prof. Su-Yun Huang.

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