國立政治大學統計學系
學　術　演　講

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題　目：Eigen-Adjusted Functional Principal Component Analysis

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地　點：國立政治大學逸仙樓 050101 教室

摘　要：

Functional Principal Component Analysis (FPCA) has become a widely-used dimension reduction tool for functional data analysis. When additional covariates are available, existing FPCA models integrate them either in the mean function or in both the mean function and the covariance function. However, methods of the first kind are not suitable for data that display second-order variation, while those of the second kind are time-consuming and make it difficult to perform subsequent statistical analyses on the dimension-reduced representations. To tackle these issues, we introduce an eigen-adjusted FPCA model that integrates covariates in the covariance function only through its eigenvalues. In particular, different structures on the covariate- specific eigenvalues – corresponding to different practical problems – are discussed to illustrate the model's flexibility as well as utility. To handle functional observations under different sampling schemes, we employ local linear smoothers to estimate the mean function and the pooled covariance function, and a weighted least square approach to estimate the covariate-specific eigenvalues. The convergence rates of the proposed estimators are further investigated under the different sampling schemes. In addition to simulation studies, the proposed model is applied to functional Magnetic Resonance Imaging scans, collected within the Human Connectome Project, for functional connectivity investigation.

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