The Chinese University of Hong Kong
Department of Statistics

Seminar

Mixture Inner Product Spaces and Application to Functional Data

By

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Abstract

We introduce the concept of mixture inner product spaces associated with a given separable Hilbert space, which feature an infinite-dimensional mixture of finite-dimensional vector spaces and are dense in the underlying Hilbert space. Any Hilbert valued random element can be arbitrarily closely approximated by mixture inner product space valued random elements. For functional data, mixture inner product spaces provide a new perspective, where each realization of the underlying stochastic process falls into one of the component spaces and is represented by a finite number of basis functions, the number of which corresponds to the dimension of the component space. Key benefits of this novel approach are, first, that it provides a new perspective on the construction of a probability density in function space under mild regularity conditions, and second, that individual trajectories possess an adaptive trajectory-specific dimension that corresponds to a latent random variable and enables flexible and parsimonious modelling of heterogeneous trajectory shapes. We establish estimation consistency of the functional mixture density and introduce an algorithm for fitting the functional mixture model based on a modified expectation-maximization algorithm. Simulations confirm that in comparison to traditional functional principal component analysis the proposed method achieves similar or better data recovery while using fewer components on average. Its practical merits are also demonstrated in an analysis of egg-laying trajectories for medflies.

Date: December 18, 2018 (Tuesday)
Time: 2:30 p.m. - 3:30 p.m.
Venue: Liang Y C Hall - LHC Room 104
The Chinese University of Hong Kong

ALL INTERESTED ARE WELCOME !!