Joint Mathematics & Applied Mathematics Colloquium

Multivariate and functional principal components without eigenanalysis

James O. Ramsay

(McGill University)
Department of Psychology

Principal components analysis is an invaluable tool in multivariate or functional data analysis, but it suffers from several defects. All fits are required to be by least squares, there is no distinction made between principal component vectors/functions and principal component scores as parameters, eigenvectors/functions as objects spanning the subspace are accorded a interpretive or substantive significance that they dont deserve, and it is difficult to introduce estimation strategies now considered essential with other methods such as regularization.

This new approach is based on a parameter cascade that defines factor scores as smooth functions of principal component vectors/functions. In the functional case, registration of time warping parameters are in turn defined as functions of factor scores and hence indirectly of principal components. In this approach, any suitable loss function may be employed for any variable in the multivariate case, or vary over time in the functional case. The method is also adaptable to non-flat manifold estimation.

Friday October 24, 2014
3-4 PM
ECCR 245