

MULTIVARIATE FUNCTIONAL PREDICTOR SELECTION

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Abstract

We propose methods for functional predictor selection and the estimation of smooth functional coefficients simultaneously in a scalar-on-function regression problem under a high-dimensional multivariate functional data setting. In particular, we develop two methods for functional group-sparse regression under a generic Hilbert space of infinite dimension. We show the convergence of algorithms and the consistency of the estimation and the selection (oracle property) under infinite-dimensional Hilbert spaces. Simulation studies show the effectiveness of the methods in both the selection and the estimation of functional coefficients. The applications to functional magnetic resonance imaging (fMRI) reveal the human brain regions related to ADHD and IQ. In addition, we apply the proposed methods to an econometric data set to find the related functional covariates to GDP of a country. To extend the results, we propose numerical algorithms for more complex models, such as nonlinear (via RKHS), logistic, sparse function-on-function, and standardization of the results of the sparse scalar-on-function models before we list the applications of these extensions to the brain image data analysis.