Estimation of Sparse Functional Additive Models with

Adaptive Group LASSO

Abstract

We study a flexible model to tackle the issue of lack of fit in the conventional functional linear regression. This model, called the sparse functional additive model, is used to characterize the relationship between a functional predictor and a scalar response of interest. The effect of the functional predictor is represented in a nonparametric additive form, where the arguments are the scaled functional principal component scores. Component selection and smoothing are considered when fitting the model to reduce the variability and enhance the prediction accuracy, while providing an adequate fit. To achieve these goals, we propose using the adaptive group LASSO method to select relevant components and smoothing splines to obtain a smoother estimate of those relevant components. Simulation studies show that the proposed estimation method compares favourably with various conventional methods in terms of prediction accuracy and component selection. The advantage of our estimation method is further demonstrated in two real data examples.