Estimation of Sparse Functional Additive Models with Adaptive Group LASSO

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Abstract: We study a flexible model to address the lack of fit in conventional functional linear regression models. 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 in order 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 and, thus, obtain a smoother estimate of those relevant components. Simulation studies show that the proposed estimation method compares favorably with conventional methods in terms of prediction accuracy and component selection. Furthermore, the advantages of our estimation method are demonstrated using two real-data examples.