Feature Extraction in Signal Regression: A Boosting Technique for Functional Data Regression

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Abstract

Signal regression means predicting or explaining a scalar response from a functional predictor (a *signal*). Main objectives of feature extraction in signal regression are the improvement of accuracy of prediction on future data and identification of relevant parts of the signal. A feature extraction procedure is proposed that uses boosting techniques to select the relevant parts of the signal. The proposed blockwise boosting procedure simultaneously selects intervals in the signal's domain and estimates the effect on the response. The blocks that are defined explicitly use the underlying metric of the signal. It is demonstrated in simulation studies and for real-world data that the proposed approach competes well with procedures like PLS, P-spline signal regression and functional data regression.