Additive Regression for Predictors of Various Natures and Hilbertian Responses with Application to Censored and Missing Data

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Abstract: In this paper we consider a fully nonparametric additive regression model for responses and predictors of various natures. This includes the case of Hilbertian and incomplete responses (like censored or missing responses), and continuous, ordinal discrete or even nominal discrete predictors. We propose a backfitting technique that estimates this additive model, and establish the existence of the estimator and the convergence of the associated backfitting algorithm under minimal conditions. We also develop a general asymptotic theory for the estimator, which includes even the case where there is no continuous predictor in the model. We verify the practical performance of the proposed estimator in an extensive simulation study, and apply the method to three data sets, containing respectively a compositional response, a functional response and a censored scalar response.