

Automatic Structure Selection for Partially Linear Models

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Partially linear models provide good compromises between linear and nonparametric models. However, given a large number of covariates, it is often difficult to objectively decide which covariates are linear and which are nonlinear. Common approaches include hypothesis testing methods and screening procedures based on univariate scatter plots. These methods are useful in practice; however, testing the linearity of multiple functions for large dimensional data is both theoretically and practically challenging, and visual screening methods are kind of ad hoc. In this work, we tackle this structure selection problem in partially linear models from the perspective of model selection. A unified estimation and selection framework is proposed and studied. The new estimator can automatically determine the linearity or nonlinearity for all covariates and at the same time consistently estimate the underlying regression functions. Both theoretical and numerical properties of the resulting estimators are presented.