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Nonparametric variable selection and its application to additive models

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Abstract
Variable selection for multivariate nonparametric regression models usually involves parameterized approximation for nonparametric functions in the objective function. However, this parameterized approximation often increases the number of parameters significantly, leading to the "curse of dimensionality" and inaccurate estimation. In this paper, we propose a novel and easily implemented approach to do variable selection in nonparametric models without parameterized approximation, enabling selection consistency to be achieved. The proposed method is applied to do variable selection for additive models. A two-stage procedure with selection and adaptive estimation is proposed, and the properties of this method are investigated. This two-stage algorithm is adaptive to the smoothness of the underlying components, and the estimation consistency can reach a parametric rate if the underlying model is really parametric. Simulation studies are conducted to examine the performance of the proposed method. Furthermore, a real data example is analyzed for illustration.

Keywords Nonparametric regression · Variable selection · Nonparametric additive model · Adaptive estimation

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