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Nonparametric Independence Screening via Favored Smoothing Bandwidth

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Abstract

We propose a flexible nonparametric regression method for ultrahigh-dimensional data. As a first step, we propose a fast screening method based on the favored smoothing bandwidth of the marginal local constant regression. Then, an iterative procedure is developed to recover both the important covariates and the regression function. Theoretically, we prove that the favored smoothing bandwidth based screening possesses the model selection consistency property. Simulation studies as well as real data analysis show the competitive performance of the new procedure.

Keywords: bandwidth, nonparametric, smoothing, variable screening
2010 MSC: 62G08, 62H12

1. Introduction

High-dimensional data are increasingly available due to the advance of data collection and storage technology in assorted scientific fields such as biology, medicine, and finance. Such high-dimensional data provide many opportunities as well as challenges for statisticians. These challenges have motivated extensive research developed in the area of variable selection. In particular, the penalization framework for variable selection has been popularized by the lasso (Tibshirani, 1996). See Fan and Lv (2010) for a selective overview of penalization-based variable selection methods.

These penalization-based variable selection methods have shown to be very effective for variable selection. Yet their corresponding asymptotic properties typically hinge on stringent conditions. For

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