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An adaptive resampling test for detecting the presence of significant predictors. (English)
Zbl 1373.62181

Summary: This article investigates marginal screening for detecting the presence of significant predictors in high-dimensional regression. Screening large numbers of predictors is a challenging problem due to the nonstandard limiting behavior of post-model-selected estimators. There is a common misconception that the oracle property for such estimators is a panacea, but the oracle property only holds away from the null hypothesis of interest in marginal screening. To address this difficulty, we propose an adaptive resampling test (ART). Our approach provides an alternative to the popular (yet conservative) Bonferroni method of controlling family-wise error rates. ART is adaptive in the sense that thresholding is used to decide whether the centered percentile bootstrap applies, and otherwise adapts to the nonstandard asymptotics in the tightest way possible. The performance of the approach is evaluated using a simulation study and applied to gene expression data and HIV drug resistance data.

MSC:
62G09 Nonparametric statistical resampling methods
62J15 Paired and multiple comparisons; multiple testing
62F40 Bootstrap, jackknife and other resampling methods
62P10 Applications of statistics to biology and medical sciences; meta analysis

Keywords:
adaptive resampling test; significant predictors; bootstrap; family-wise error rate; marginal regression; nonregular asymptotics; screening covariates

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