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A robust adaptive-to-model enhancement test for parametric single-index models

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Abstract This paper is devoted to test the parametric single-index structure of the underlying model when there are outliers in observations. First, a test that is robust against outliers is suggested. The Hampel's second-order influence function of the test statistic is proved to be bounded. Second, the test fully uses the dimension reduction structure of the hypothetical model and automatically adapts to alternative models when the null hypothesis is false. Thus, the test can greatly overcome the dimensionality problem and is still omnibus against general alternative models. The performance of the test is demonstrated by both Monte Carlo simulation studies and an application to a real dataset.

Keywords Bounded influence function · Dimension reduction · Model checking · Omnibus property · Robust adaptive-to-model test

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