

Robust Depth-Weighted Wavelet for Nonparametric Regression Models

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Abstract

In the nonparametric regression models, the original regression estimators including kernel estimator, Fourier series estimator and wavelet estimator are always constructed by weighted sum of data and the weights depend only on the distance between the design points and estimation points. As a result these estimators are not robust to the perturbations in data. In order to avoid this problem, a new nonparametric regression model, called depth-weighted regression model, is introduced and then depth-weighted wavelet estimation is defined. The new estimation is robust to the perturbations in data, which attains very high breakdown value close to $1/2$. On the other hand some asymptotic behaviours such as asymptotic normality are obtained. But the asymptotic normality indicates that, as a price to pay for robustness, the depth-weighted wavelet estimation is less efficient than the original wavelet estimation.

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