

Title:

On Some Exact Properties of Wavelet Regression and Density Estimation

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Abstract:

In this paper, we give an exact formulation for the wavelet estimator, that can be applied in density, regression on a regular grid and regression with a random design. This formulation is handy and allows us to better understand the type of bias due to a given method for the estimation of the coefficients at the high resolution. In the second part of the paper, we use the result obtained previously to compute the influence function of various wavelet estimators. This tool allows us to see how the influences of observations can be different depending on their locations. The lack of shift-invariance can also be investigated. The influence function is also useful to compare two different approximation schemes for the wavelet estimator. We show that a local linear regression type approximation for the higher resolution coefficients induces a more extreme and variable influence of the observations on the final estimator than the more usual approximation.