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Nonparametric regression with warped wavelets and strong mixing processes

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Abstract
We consider the situation of a univariate nonparametric regression where either the Gaussian error or the predictor follows a stationary strong mixing stochastic process and the other term follows an independent and identically distributed sequence. Also, we estimate the regression function by expanding it in a wavelet basis and applying a hard threshold to the coefficients. Since the observations of the predictor are unequally distant from each other, we work with wavelets warped by the density of the predictor variable. This choice enables us to retain some theoretical and computational properties of wavelets. We propose a unique estimator and show that some of its properties are the same for both model specifications. Specifically, in both cases the coefficients are unbiased and their variances decay at the same rate. Also the risk of the estimator, measured by the mean integrated square error is almost minimax and its maxiset remains unaltered. Simulations and an application illustrate the similarities and differences of the proposed estimator in both situations.

Keywords Nonparametric regression · Wavelet · Stationary process · α-mixing, Warped wavelets

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