

Felix Abramovich · Claudia Angelini
Daniela De Canditiis

Pointwise optimality of Bayesian wavelet estimators

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Abstract We consider pointwise mean squared errors of several known Bayesian wavelet estimators, namely, posterior mean, posterior median and Bayes Factor, where the prior imposed on wavelet coefficients is a mixture of an atom of probability zero and a Gaussian density. We show that for the properly chosen hyperparameters of the prior, all the three estimators are (up to a log-factor) asymptotically minimax within any prescribed Besov ball $B_{p,q}^s(M)$. We discuss the Bayesian paradox and compare the results for the pointwise squared risk with those for the global mean squared error.

Keywords Bayes Factor · Bayes model · Bayesian paradox · Besov spaces · Minimax rates · Nonparametric regression · Point estimation · Posterior mean · Posterior median · Wavelets