

The multiresolution criterion and nonparametric regression

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Selecting the amount of smoothing in nonparametric regression can be considered as a problem of model choice. Most existing methods require some prior knowledge of the smoothness or similar characteristics of the object to be recovered. Recently some methods have been proposed that take a different approach: candidate estimates of increasing complexity are produced until a model is found that could have generated the data. Davies and Kovac (2001) in the context of their taut string procedure propose a multiresolution criterion that can be used for this purpose. It has subsequently also been used in other related methods (e.g. Davies and Meise, 2008). We give a geometric interpretation of this criterion in terms of a special norm of the residual vector and present some properties of this norm (Mildenberger 2008). In addition results of a large simulation study are reported, where several procedures of nonparametric regression were compared under different data generating mechanisms. Different measures of performance were considered such as the correct identification of peaks and the distance of the estimated function from the generating function. Residual-based methods are shown to perform quite well in different scenarios (Davies, Gather, Weinert 2008).

References:

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