Additive Models for Quantile Regression: Model Selection and Confidence Bandaids
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Additive models for conditional quantile functions provide an attractive framework for non-parametric regression applications focused on features of the response beyond its central tendency. Total variation roughness penalties can be used to control the smoothness of the additive components much as squared Sobolev penalties are used for classical $L_2$ smoothing splines. We describe a general approach to estimation and inference for additive models of this type. We focus attention primarily on selection of smoothing parameters and on the construction of confidence bands for the nonparametric components. Both pointwise and uniform confidence bands are introduced; the uniform bands are based on the Hotelling (1939) tube approach. Some simulation evidence is presented to evaluate finite sample performance and the methods are also illustrated with an application to modeling childhood malnutrition in India.