Inference based on Laplace approximations in nonparametric additive location-scale model for censored data

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In a previous publication on nonparametric additive location-scale models for interval censored data [1], we explained how P-splines could be used in regression models to specify a smooth error density and the joint (possibly) nonlinear effects of covariates on location and dispersion. That methodology extends traditional additive regression models by releasing the parametric constraint on the error distribution and by acknowledging that covariates can affect multiple aspects of the conditional distribution in a non-trivial way. These extensions are very attractive and practically useful, but have an important computational cost following from the use of the Metropolis-within-Gibbs algorithm in a richly parameterized model. By extending the results in [2], we show how Laplace based approximations to the marginal posterior distributions of smoothness parameters can be used to set up a quickly converging iterative algorithm to select penalty parameters and to estimate the spline parameters in the pivotal distribution and in the additive components for location and dispersion.

Simulations suggest that the so-obtained estimators have excellent frequentist properties. They can also be combined in a Bayesian setting to select starting values and proposal distributions in a Metropolis-within-Gibbs algorithm.

We illustrate the methodology on various datasets involving different forms of censoring on the response. We also investigate how that strategy can be adapted to analyze survival data with an unknown cured fraction [3,4].

KEYWORDS
Nonparametric additive model ; Location-scale model ; P-splines ; Laplace approximation
REFERENCES


