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Inference and computation with generalized additive models and their extensions. (English)
[Zbl 1447.62085]

Summary: Regression models in which a response variable is related to smooth functions of some predictor variables are popular as a result of their appealing balance between flexibility and interpretability. Since the original generalized additive models of T. J. Hastie and R. J. Tibshirani [Generalized additive models. London etc.: Chapman and Hall (1990; Zbl 0747.62061)] numerous model extensions have been proposed, and a variety of practically useful computational strategies have emerged. This paper provides an overview of some widely applicable frameworks for this type of modelling, emphasizing the similarities between the different approaches, and the equivalence of smoothing, Gaussian latent process models and Gaussian random effects. The focus is particularly on Bayes empirical smoother theory, fully Bayesian inference via stochastic simulation or integrated nested Laplace approximation and boosting.

MSC:
62J05 Linear regression; mixed models
62J07 Ridge regression; shrinkage estimators (Lasso)
62J12 Generalized linear models (logistic models)

Keywords:
smoothing; regression; smoothing parameters; INLA; boosting; empirical Bayes; reduced rank

Software:
TMB; SemiPar; VGAMdata; gss; GMRFLib; JAGS; BayesX; gamair; CSparse; GAMLSS

Full Text: DOI

References:
[51] Stasinopoulos, MD; Rigby, RA; Heller, GZ; Voudouris, V.; De Bastiani, F., Flexible regression and smoothing: using GAMnSS in R (2017), Boca Raton: Chapman and Hall/CRC, Boca Raton

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