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Title:

A Generalized Estimating Equation approach to Multivariate Adaptive Regression Spline

Abstract:

Multivariate adaptive regression splines (MARS) is a popular nonparametric regression tool often used for prediction and uncovering important data patterns between the response and predictor variables. The standard MARS algorithm assumes responses are normally distributed and independent, but in this study we relax both of these assumptions by extending MARS to generalized estimating equations. We refer to this MARS-for-GEEs algorithm as "MARGE". Our algorithm makes use of fast forward selection techniques, such that in the univariate case, MARGE has similar computation speed to a standard MARS implementation. Through simulation we show that the proposed algorithm has improved predictive performance compared with the original MARS algorithm when using correlated and/or non-normal response data and is competitive with alternatives in the literature, especially for problems with multiple interacting predictors. We apply MARGE to various ecological examples with different data types.