MODELLING THE RANDOM EFFECTS COVARIANCE MATRIX IN THE GENERALIZED ADDITIVE MIXED MODEL

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The random effects covariance matrix in mixed models is usually assumed constant across subject. Little work has been done on modelling the random effects covariance matrix in the generalized additive mixed model (GAMM). We parametrize this covariance matrix in terms of covariates by way of a Cholesky decomposition, providing parsimonious parameters to model which have a logical statistical interpretation. A transformation of the nonparametric functions to linear mixed models is carried out by using cubic smoothing splines. This results in a transformation of the GAMM into a generalized linear mixed model, which can then be fitted using a modified version of the EM algorithm originally developed for the GLMM. The idea of allowing the variance components parameters to depend on subject-specific covariates allows to account for heterogeneous variations from different sources. Real data analysis and simulation studies show that the estimation procedure is effective in obtaining reliable estimates of the nonparametric functions, the estimation of the fixed effects and variance components, as well as the parameters of the random effects covariance matrices.