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Mode jumping MCMC for Bayesian variable selection in GLMM

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Abstract

Generalized linear mixed models (GLMM) are used for inference and prediction in a wide range of different applications providing a powerful scientific tool. An increasing number of sources of data are becoming available, introducing a variety of candidate explanatory variables for these models. Selection of an optimal combination of variables is thus becoming crucial. In a Bayesian setting, the posterior distribution of the models, based on the observed data, can be viewed as a relevant measure for the model evidence. The number of possible models increases exponentially in the number of candidate variables. Moreover, the space of models has numerous local extrema in terms of posterior model probabilities. To resolve these issues a novel MCMC algorithm for the search through the model space via efficient mode jumping for GLMMs is introduced. The algorithm is based on

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The paper has supplementary materials consisting of:

R package: *R* package *EMJMCMC* to perform the efficient mode jumping MCMC described in the paper. (EMJMCMC_1.2.tar.gz; GNU zipped tar file).

Data and code: Data (simulated and real) and *R* code for MJMCMC algorithm, post-processing and creating figures wrapped together into a reference based EMJMCMC class. (code-and-data.zip; zip file containing the data, code and a read-me file (readme.pdf))

Details and Pseudo code: Proofs of the ergodicity of MJMCMC procedure, pseudo codes for MJMCMC and local combinatorial optimizers, parallelization strategies and some supplementary tables for the experiments. (appendix.pdf)

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