Bayesian inference for multivariate random effects model

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Abstract

Objective Bayesian inference procedures are derived for the parameters of the multivariate random effects model generalized to elliptically contoured distributions. The posterior for the overall mean vector and the between-study covariance matrix is deduced by assigning two noninformative priors to the model parameter, namely the Berger and Bernardo reference prior (see, [1]) and the Jeffreys prior (see, [3]), whose analytical expressions are obtained under weak distributional assumptions. It is shown that the only condition needed for the posterior to be proper is that the sample size is larger than the dimension of the data-generating model. Similarly to the univariate case, the statement holds independently of the class of elliptically contoured distributions used in the definition of the generalized multivariate random effects model (cf., [2]). The theoretical findings of the paper are applied to real data consisting of ten studies about the effectiveness of hypertension treatment for reducing blood pressure where the treatment effects on both the systolic blood pressure and diastolic blood pressure are investigated.

Keywords

Multivariate random effects model, noninformative prior, propriety, elliptically contoured distribution, multivariate meta-analysis

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