Bayesian computational strategies for multivariate t linear mixed models with missing outcomes

Tsung-I Lin*
Institute of Statistics, National Chung Hsing University, Taichung, Taiwan – tilin@nchu.edu.tw

Wan-Lun Wang
Department of Statistics, Feng Chia University, Taichung, Taiwan – wlunwang@fcu.edu.tw

Multivariate t linear mixed models (MtLMM) have been recently proposed as a robust tool for analyzing multivariate longitudinal data with outlying observations and missing values simultaneously. As a powerful alternative to the traditional EM-type algorithm employing only single imputed values, this paper provides a Bayesian imputation method for the MtLMM to account for the uncertainties of model parameters as well as missing outcomes. Natural conjugate and weakly informative priors are employed to ensure properness and robustness in the sense that the posterior inference would not be influenced too much by the choice of hyperparameters. An inverse Bayes formulas (IBF) sampler coupled with Metropolis-within-Gibbs scheme is used to effectively draw the posterior distributions of latent data and model parameters. The techniques for multiple imputation of missing values, estimation of random effects, and diagnostics of potential outliers are investigated as well. The proposed methodology is illustrated through a simulation study and an application to AIDS/HIV data.

Keywords: conditional conjugate priors; damped exponential correlation; data augmentation; IBF sampler; missing data.