Bayesian Joint Mean-Covariance Modelling for Longitudinal Data Using the Multivariate *t* Distribution

Tsung-I Lin

National Chung Hsing University, Taiwan
tilin@amath.nchu.edu.tw

Abstract

This paper presents a fully Bayesian approach to multivariate *t* regression models whose mean vector and scale covariance matrix are modelled jointly for analyzing longitudinal data. The scale covariance structure is factorized in terms of unconstrained autoregressive and scale innovation parameters through a modified Cholesky decomposition. A computationally flexible data augmentation sampler coupled with the Metropolis-within-Gibbs scheme is developed for computing the posterior distributions of parameters. The Bayesian predictive inference for the future response vector is also investigated. The proposed methodologies are illustrated through a real example from a sleep dose-response study.

Keywords: Cholesky decomposition; Data augmentation; Deviance information criterion; Maximum likelihood estimation; Outliers; Predictive distribution.