# Bayesian Cumulative Probit Linear Mixed Models for Longitudinal Ordinary Data

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Longitudinal studies have been conducted in a wide variety of application areas, including medicine, economics and social sciences. In such studies, longitudinal data are collected over time, and thus repeated outcomes within each subject may therefore tend to be serially correlated. To account for both the serial correlation within subjects and the specific variability between subjects, we propose a Bayesian cumulative probit random effects model to analyze longitudinal ordinal data using the hypersphere decomposition approach to solve the positive-definiteness constraint and high-dimensionality of the correlation matrix. To accelerate the convergence of the Monte Carlo algorithm, we propose a hybrid of the Gibbs/Metropolis-Hastings algorithm to generate cutoff points from the truncated normal distributions. We explore the performance of the proposed method in simulation studies, then with two actual ordinal data sets, psychiatric and arthritis, for further illustration. To produce the results, we developed an open source R package, BayesRGMM, available on CRAN with full documentation and source code available at https://github.com/kuojunglee/BayesRGMM/ to produce the results.

Keywords: Correlation matrix; hypersphere decomposition; MCMC; random effects