

A robustness evaluation of Bayesian tests for longitudinal data

Lukas Arnroth and Rauf Ahmad

Uppsala University, Sweden

Abstract

Linear mixed models are standard models to analyse repeated measures or longitudinal data under the assumption of normality for random components in the model. Although the mixed models are often used in both frequentist and Bayesian inference, their evaluation from robustness perspective has not received as much attention in Bayesian inference as in frequentist. The aim of this study is to evaluate Bayesian tests in mixed models for their robustness to normality. We use a general class of exponential power distributions, EPD, and particularly focus on testing fixed effects in longitudinal models. The EPD class contains both light and heavy tailed distributions, with normality as a special case. Further, we consider a new paradigm of Bayesian testing decision theory where the hypotheses are formulated as a mixture model, with subsequent testing based on the posterior distribution of the mixture weights. It is shown that the EPD class provides a flexible alternative to normality assumption, particularly in the presence of outliers. Real data applications are also demonstrated.