

Assessing skewness, kurtosis and normality in linear mixed models

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Abstract

Linear mixed models provide a useful tool to fit continuous longitudinal data, with the random effects and error term commonly assumed to have normal distributions. However, this restrictive assumption can result in a lack of robustness and needs to be tested. In this paper, we propose tests for skewness, kurtosis and normality based on generalized least squares (GLS) residuals. To do it, estimating higher order moments is necessary and an alternative estimation procedure is developed. Compared to other procedures in the literature, our approach provides a closed-form expression even for the third and fourth order moments. In addition, no further distributional assumptions on neither random effects or error terms are needed to show the consistency of the proposed estimators and tests statistics. Their finite sample performance is examined in a Monte Carlo study and the methodology is used to examine changes in the life expectancy and maternal and infant mortality rate of a sample of OECD countries.^[1]

Key Words: linear mixed model; moment estimator; longitudinal data; skewness; kurtosis; normality.

1 Introduction

Linear mixed models are widely accepted statistical tools to model a variety of intra-group correlation patterns and they have received considerable attention in biomedical, social and

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