A novel method for testing normality in a mixed model of a nested classification

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Abstract

Normality is one of the most common assumptions made in the development of statistical models such as the fixed effect model and the random effect model. The fixed effect model assumes an independent error vector but the residual vector obtained from the model is correlated. White and MacDonald (1980) and Bonett and Woodward (1990) showed many well-known normality tests perform well in examining the normality assumption for the correlated residuals under the fixed effect model. However, under the random effect model, the error vector is no longer independent. In turn, the existing normality tests may not be appropriate for evaluating the model assumption.

In this paper, we propose a transformation method to convert the correlated error vector into an uncorrelated vector, which becomes an independent vector under the normality assumption. As a result, all the existing methods can then be implemented. Monte-Carlo simulations are used to evaluate the feasibility of the transformation. Results show that this transformation method can preserve the Type I error and provide greater powers under most alternatives.