Fixed effects estimation in two-variance components models

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Abstract

In linear mixed models, it is well known that inference about the fixed effects parameters is not straightforward even under normality assumptions. Unless the model is balanced, in other words, unless the model matrices meet the necessary and sufficient conditions for the best linear unbiased estimator (BLUE) and ordinary least squares estimator (OLSE) to coincide, there is no closed form of the empirical version of the BLUE obtained by, say maximum likelihood method. For example, in case of a two-way analysis of variance model with random effects the situation is challenging since it is not obvious how to set up the test statistic so that inference can rely on the F-distribution.

We have adapted the ideas suggested in, e.g., [3],[4], [1], and [5] and developed an explicit estimator of fixed effects in a mixed linear model with two variance components (see [7]) under rather general conditions. The new proposed estimator is based on a partition of the sampling space and on a re-sampled subvector from a linearly transformed residual vector. The newly proposed estimator can be considered as an alternative to the classic moment estimators. Generalizations of the suggested estimator are also investigated.

Keywords Fixed and random effects, estimation, resampling

References

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