

Building stones for inference on variance components

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Abstract

In his paper, Burch [1] suggested how to make inference on variance components in linear mixed models provided a certain decomposition of the covariance matrix exists and he showed how these ideas apply in some cases of two-way random effects models without interactions. However, he did not show how to derive the requested building stones - independent quadratic forms - in general. We will point out that his approach can be viewed as a generalization of the ANOVA decomposition of the total sum of squares. Then the requirement of independence leads to a decomposition of the $(n - p)$ -dimensional space into orthogonal invariant subspaces and in a case most favourable for inference, this immediately suggests an algorithm for derivation of the requested quantities. The presented approach also allows for characterizing designs in which the favourable procedure is applicable as we will illustrate for the case of two-way random effects models.

Keywords

Independent quadratic forms, Variance components, ANOVA, Invariant subspaces.

References

- [1] Burch, B.D. (2007). Generalized confidence intervals for proportions of total variance in mixed linear models. *J. Statist. Plann. Inference* 137, 2394-2404.