# A reduction dimension technique for conducting inference in mixed models

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## Abstract

In normal linear mixed models, inference becomes quite critical when the orthogonality conditions fail to hold. Namely, given that an analytical approach to maximum likelihood methods becomes intractable, the application of the classical likelihood ratio tests can become computationally prohibitive. In this paper, we show that in linear mixed models, the maximum likelihood problem can be rewritten as an optimization problem whose search domain dimension equals the number of variance components of the original model, minus one. The developed dimension reduction technique, makes thus feasible with large computational savings the computation of maximum likelihood estimates, for the mixed model parameters and the variance components. The established result can thus be applied in broader circumstances to conduct inference, using the likelihood ratio tests for fixed effects and variance components. An important spin-off of such result is that the complexity of the maximum likelihood problem does not depend on the number of regressors considered. We provide an application to the simple one-way model through Monte Carlo simulation in both, the unbalanced and balanced cases.

## References

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