

On determinant maximization with linear matrix inequality constraints and REML estimators of variance components

Mariusz Grządziel

Wrocław University of Environmental and Life Sciences, Poland

Abstract

It is shown how modern interior point methods for solving a class on convex optimization problems over the cone of nonnegative definite matrices ("determinant maximization with linear matrix inequality constraints", see Vandenberghe et al. (1998)) can be used for finding residual maximum likelihood (REML) estimators of variance components in linear mixed models. The class of mixed models considered can be defined in terms of quadratic subspaces (or Jordan algebras) of symmetric matrices (see Rao et al., 1998, Chap. 13; Grządziel, 2007) and includes many balanced models with random effects. The efficiency of our approach is evaluated by a simulation experiment.

Keywords

Cone of nonnegative definite matrices, Linear mixed model, Quadratic subspace of symmetric matrices.

References:

- Grządziel, M. (2007). Quadratic subspaces and construction of Bayes invariant quadratic estimators in mixed linear models. Accepted for publication in *Statist. Papers*.
- Rao, C.R. and M.B. Rao (1998). *Matrix algebra and its applications to statistics and econometrics*. Singapore:World Scientific Publishing.
- Vandenberghe, L., S. Boyd and S.-P. Wu (1998). Determinant maximization with linear matrix inequality constraints. *SIAM J. Matrix Anal. Appl.* 19, 499–533.