

Hypothesis Testing in Multilevel Models with Block-Invariant Covariance Matrices

Yuli Liang*

Stockholm University, Stockholm, Sweden yuli.liang@stat.su.se

Tatjana von Rosen

Stockholm University, Stockholm, Sweden tatjana.vonrosen@stat.su.se

Dietrich von Rosen

Swedish University of Agricultural Sciences, Sweden

dietrich.von.rosen@slu.se

Very often hierarchically structured data exhibit specific dependency in one or many levels, e.g. spatially or temporally correlated, due to different data generating processes. Using patterned covariance matrices in multilevel models can reduce the number of unknown parameters dramatically and it helps in a lot of statistical studies especially for some data with small samples. However, we should be careful when using specific covariance structures since incorrect assumptions may result in invalid conclusions. Thus, testing the validity of different structures is crucial before using them for any statistical analysis. This presentation will describe testing problems that arise under assumptions of block circular symmetry and two types of block compound symmetry. We propose a number of hypothesis tests and develop likelihood ratio test (LRT), including their approximate null distributions of the LRT.

Key Words: Compound symmetry, Circular symmetry, Likelihood ratio test, Variance components