University Medical Center Göttingen
Department of Medical Statistics

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Hierarchical / Multilevel Models

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A graphical tool and formal test for assessing the random-effects distribution in mixed models

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Abstract:
Inference in mixed models is often based on the marginal distribution of the outcome, obtained from integrating out random effects over a pre-specified, often parametric, distribution. In this presentation, the so-called gradient function will be presented as a simple graphical exploratory diagnostic tool to assess whether the assumed random-effects distribution produces an adequate fit to the data, in terms of marginal likelihood. The method does not require any calculations in addition to the computations needed to fit the model, and can be applied to a wide range of mixed models (linear, generalized linear, non-linear), with univariate as well as multivariate random effects. In case of model misspecification, the gradient function gives an important, albeit informal, indication on how the model can be improved in terms of random-effects distribution. Furthermore, the tool can serve as basis for formal goodness-of-fit tests for random-effects distributions. The graphical tool and the tests derived from it will be illustrated using simulated examples, simulations, as well real data from a longitudinal study with binary outcome values.

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