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A Multiple Comparison Procedure Based on a Variant of the Schwarz Information Criterion in Mixed Models

Repeated measurements are collected in a variety of situations and are generally characterized by a mixed model where the correlation within the subject is specified by the random effects. In such a mixed model, we propose a multiple comparison procedure based on a variant of the Schwarz information criterion (SIC, Schwarz, 1978). The derivation of SIC indicates that SIC serves as an asymptotic approximation to a transformation of the Bayesian posterior probability of a candidate model. Therefore, an approximated posterior probability for a candidate model can be calculated based upon SIC. We suggest a variant of SIC which includes the terms which are asymptotically negligible in the derivation of SIC. The variant improves upon the performance of SIC in small and moderate sample-size applications. Based upon the proposed variant, the corresponding posterior probability is calculated for each candidate model. A hypothesis testing for multiple comparisons involves one or more models in the candidate class, the posterior probability of the hypothesis testing is therefore evaluated as the sum of the posterior probabilities for the models associated with the testing. The approximated posterior probability based on the variant accommodates the effect of the prior on each model in the candidate class, and therefore is more effectively approximated than that based on SIC for conducting multiple comparisons. We derive the computational formula of the approximated posterior probability based on the variant in the mixed model. The applications demonstrate that the proposed procedure based on the SIC variant can perform effectively in multiple comparisons.