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Mixed model selection via profile log-likelihood

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Mixed models accommodating both fixed effects and random effects are widely utilized to describe the complicatedly correlated data in a variety of fields. To feasibly and effectually model the data, choosing the most appropriate mixed model from a candidate class serves as an appealing exploration in statistical modelling. However, mixed model selection poses an intricate challenge in that both the set of covariates for the fixed effects and the structure for the random effects are taken into account of selection procedure. For effectively selecting both the fixed and random effects, we propose a two-stage mixed model selection procedure based upon the penalized profile log-likelihood. In the first stage, the random effects are selected using the penalized term. After the completion of the random effects selection, in the second stage, the fixed effects are selected using another penalized term. In each stage, the Newton-Raphson algorithm is carried out to implement parameter estimation. To decide on the tuning parameter in the penalized term in each stage, the Bayesian Information Criterion (BIC) is employed. We prove that the proposed procedure possesses the oracle properties, implying that asymptotically the proposed procedure will choose the true model for generating the data. For the illustration of the performance of proposed selection procedure, we conduct the simulations and an application of a real data example. In the simulations, the comparison with other procedures for mixed model selection is also fulfilled in the form of model errors and Kullback-Leibler discrepancies. The simulation results and the application show that the proposed two-stage procedure perform effectively in selecting the best covariates and random covariance structure.

Biography

Juming Pan is a PhD candidate in Statistics at Bowling Green State University, Ohio, USA. His research interests include model selection, linear mixed models and survival analysis.

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