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Title: A Semiparametric Block Bootstrap Approach for Clustered Data

Abstract: An accurate estimate of the uncertainty associated with a parameter estimate is important if we want to avoid misleading inference. The bootstrap technique (Efron, 1979; Efron and Tibshirani, 1993) is a very general way of measuring the accuracy of estimators, and was originally developed for parameter estimation given independent identically distributed (i.i.d.) data. However, random effects models for hierarchically dependent data, e.g. clustered data, are now widely used. With such data it is important to use bootstrap techniques that retain the hierarchical dependence structure. A widely used approach for such data is the parametric bootstrap based on an assumed hierarchical random effects model. This is usually very effective provided this model is correctly specified. On the other hand, if the variability assumptions of the model, e.g. the assumption that the random effects are iid Normal random variables, are violated, then it is hard to justify use of the parametric bootstrap. See for example, Rasbash et al. (2000) and Carpenter et al. (2003) and references therein. In this talk we will introduce a semi parametric block bootstrap approach for clustered data. This approach is semi-parametric in the sense that the marginal model is generated parametrically while the dependence structure in the model residuals is generated non-parametrically. The proposed method is simple to implement and is free of both the distribution and the dependence assumptions of the parametric bootstrap. Its main assumptions are that the marginal models are correct. Empirical evaluations based on limited simulation studies show that the proposed approach works well.