Bayesian posterior estimation of parameters and standard errors in latent class models.

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Abstract
This article investigates the estimation of the parameters of latent class models and their respective standard errors when certain parameter estimates may be on the boundary of the parameter space (e.g., estimated probabilities that are equal to 0 or 1). De Menezes (1999) proposed the parametric bootstrap as a method to approximate standard errors. However, this method does not solve the occurrence of estimates on the boundary, which arise from the tendency of the Maximum Likelihood method to make the latent classes as much extreme as possible. In contrast to de Menezes' approach, Bayesian methods solve the estimation problem by using prior distributions. In this approach, the latent classes are "smoothed" by adding extra frequencies to the observed data. Normally, the prior distribution is chosen in accordance with an empirical theory or previous studies; however, if no previous knowledge is available, noninformative priors are an attractive alternative. A simulation study is done to investigate the bias and median squared error of the estimates of the parameters, and the accuracy of the standard errors by studying the coverage probabilities and widths of the associated confidence intervals. The results indicate a clear superiority of the posterior mode to the maximum likelihood estimates. Concerning the choice of the prior, we explain why the most reasonable ones may be Dirichlet priors, because of the fact that their parameters preserve the observed distribution (Vermunt & Magidson, 1997).

References

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