An Automated Candidate Estimator for Marginal Likelihood Estimation with Application to Factor Analytic Dimensionality Selection

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We review Markov chain Monte Carlo (MCMC) computation of the marginal likelihood, which is the pivotal quantity for construction of the Bayes factor (BF), a key Bayesian model selection criterion. The candidate estimator method for marginal likelihood computation is adapted to deal with (i) improper noninformative priors and (ii) the existence of (well-separated) symmetric posterior modes due to permutative invariance over the parameter indices, such that the ensuing BF is still determinate. The provisions provide for what can be seen as a simulation consistent MCMC implementation of well-known default BFs. This automated candidate estimator is subsequently applied to the in factor analytic efforts important topic of latent factor dimensionality selection. This application is inspired by (i) a desire to stringently test the provisions and (ii) to spur learning on some lesser known indeterminacies in the factor model and their interrelationships with computational approaches towards dimensionality selection. In passing, we provide for an appropriate stopping rule for factor analytic data compression.