

OPTIMAL VOLUME-CORRECTED LAPLACE-METROPOLIS METHOD

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Abstract. The article provides a refinement for the volume-corrected Laplace-Metropolis estimator of the marginal likelihood of DiCiccio *et al.* The correction volume of probability α in DiCiccio *et al.* is fixed and suggested to take the value $\alpha = 0.05$. In this article α is selected based on an asymptotic analysis to minimize the mean square relative error (MSRE). This optimal choice of α is shown to be invariant under linear transformations. The invariance property leads to easy implementation for multivariate problems. An implementation procedure is provided for practical use. A simulation study and a real data example are presented.

Key words and phrases: Bayes factor, Laplace approximation, marginal probability, Markov chain Monte Carlo.