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Easily Computed Marginal Likelihoods for Multivariate Mixture Models Using the THAMES Estimator

We present a new version of the truncated harmonic mean estimator (THAMES) for univariate or multivariate mixture models. The estimator computes the marginal likelihood from Markov chain Monte Carlo (MCMC) samples, is consistent, asymptotically normal and of finite variance. In addition, it is invariant to label switching, does not require posterior samples from hidden allocation vectors, and is easily approximated, even for an arbitrarily high number of components. Its computational efficiency is based on an asymptotically optimal ordering of the parameter space, which can in turn be used to provide useful visualisations. We test it in simulation settings where the true marginal likelihood is available analytically. It performs well against state-of-the-art competitors, even in multivariate settings with a high number of components. We demonstrate its utility for inference and model selection on univariate and multivariate data sets.

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