



Consistency of Variational Bayes Inference for Estimation and Model Selection in Mixtures

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Résumé : Mixture models are widely used in Bayesian statistics and machine learning and proved their efficiency in many fields such as computational biology or natural language processing... Variational inference, a technique for approximating intractable posteriors thanks to optimization algorithms, is extremely popular in practice when dealing with complex models such as mixtures. The contribution of this paper is two-fold. First, we study the concentration of variational approximations of posteriors, which is still an open problem for general mixtures, and we derive consistency and rates of convergence. We also tackle the problem of model selection for the number of components : we study the approach already used in practice, which consists in maximizing a numerical criterion (ELBO). We prove that this strategy indeed leads to strong oracle inequalities. We illustrate our theoretical results by applications to Gaussian and multinomial mixtures.

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