## **REJECTION SAMPLING FOR MIXTURE MODELS**

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Finite mixtures of distributions provide a exible way to model the data which comes from one of K latent classes. This kind of data exists in many research areas, such as astronomy, biology, genetics and medicine. Markov chain Monte Carlo (MCMC) is the most popular method for sampling from the posterior of mixture models. However, MCMC method only provides approximate realisations from the posterior. Perfect sampling for the posterior of mixture models, which provides exact realisations, is an active research area recently. But none of the existing perfect sampling methods is practical and able to deal with large sample sizes and large value of K, since it requires either large computer memory or long computational time. In this paper we introduce a rejection sampling method (called G-A Mean Bound method) to perform perfect sampling for the posterior of the simple mixture models. With this method, the hat function can be easily constructed and we have a very high accept probability. Simulation results show that the G-A Mean Bound method is hundreds of times faster than all the existing perfect sampling methods and uses little computer memory. It can deal with large sample sizes and large value of K. Theoretical proof is also given. This paper also develops a mixed MCMC sampler for complex mixture models, based on G-A Mean Bound method and Gibbs sampler (or Metropolis-Hasting algorithm). This mixed MCMC sampler has much better mixing property than the traditional Gibbs sampler.