

Markov Chain Monte Carlo: algorithms for multimodal distribution and their applications

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As introduction, history and software of Markov chain Monte Carlo is briefly discussed. Then, replica exchange method (parallel tempering) is explained as a useful tool for sampling multimodal distributions. It is also stressed that applications of Markov chain Monte Carlo are not restricted to statistical physics or Bayesian computation; it can deal with a variety of problems related to high dimensional probability, such as counting the number of discrete structures, sampling rare orbits in nonlinear dynamical systems, statistical testing under complicated null hypothesis.

Keywords: Markov Chain Monte Carlo, Replica Exchange Monte Carlo (Parallel Tempering), Bayesian modeling, rare event sampling