

# ADAPTIVE AND INTERACTING MCMC ALGORITHMS

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## ABSTRACT

We review adaptive Markov chain Monte Carlo algorithms (MCMC) as a mean to optimise their mixing property. Using simple examples, we introduce a general theoretical framework, covering a large number of adaptation algorithms, including both "internal" and "external" adaptations and the case where the parameter to adapt is in finite dimensional (the so-called self-interacting MCMC). This theory leads to guidelines concerning the design of proper algorithms. We then review criteria and propose methods which allows one to systematically optimize generally used criteria, but also analyze the properties of the resulting adaptive MCMC algorithms. We then propose a series of novel adaptive algorithms which prove to be robust and reliable in practice. The behavior of these algorithms is illustrated on some difficult multimodal scenarios.