On the empirical efficiency of local MCMC algorithms with auxiliary variables

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In an attempt to improve on the Metropolis algorithm, various MCMC methods with auxiliary variables, such as the multiple-try and delayed rejection Metropolis algorithms, have been proposed. These methods generate several candidates in a single iteration; accordingly they are computationally more intensive than the Metropolis algorithm. It is usually difficult to provide a general estimate for the computational cost of a method without being overly conservative; potentially efficient methods could thus be overlooked by relying on such estimates. In this talk, we describe three algorithms with auxiliary variables - the multiple-try Metropolis (MTM) algorithm, the multiple-try Metropolis hit-and-run (MTM-HR) algorithm, and the delayed rejection Metropolis algorithm with antithetic proposals (DR-A) - and investigate the net performance of these algorithms in various contexts. To allow for a fair comparison, the study is carried under optimal mixing conditions for each of these algorithms. The DR-A algorithm, whose proposal scheme introduces correlation in the pool of candidates, seems particularly promising. The algorithms are used in the contexts of Bayesian logistic regressions and classical inference for a linear regression model. This talk is based on work in collaboration with M. Mireuta, E. Moulines, and R. Douc.