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Bayesian Inference of Stochastic Volatility Model by Hybrid Monte Carlo

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The hybrid Monte Carlo (HMC) algorithm is applied for the Bayesian inference of the stochastic volatility (SV) model. We use the HMC algorithm for the Markov chain Monte Carlo updates of volatility variables of the SV model. First we compute parameters of the SV model by using the artificial financial data and compare the results from the HMC algorithm with those from the Metropolis algorithm. We find that the HMC algorithm decorrelates the volatility variables faster than the Metropolis algorithm. Second we make an empirical study for the time series of the Nikkei 225 stock index by the HMC algorithm. We find the similar correlation behavior for the sampled data to the results from the artificial financial data and obtain a ϕ value close to one ($\phi \approx 0.977$), which means that the time series has the strong persistency of the volatility shock.

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