Sequential MCMC Particle Algorithms for Discrete-Time Nonlinear Filtering

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In this work we show how a carefully designed instrumental distribution can improve the performance of a recently derived Markov chain Monte Carlo (MCMC) particle filter. In particular, we devise a special subgradient-based kernel from which candidate moves are drawn. This in turn facilitates the implementation of the filtering algorithm in high dimensional settings using a remarkably small number of particles. We demonstrate our approach in solving a nonlinear non-Gaussian dynamic compressed sensing (l_1 constrained) problem with a state dimension of up to 100.