

Interacting Particle Systems for Sequential Parameter Learning

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Abstract

Interacting particle systems (IPS) provide a class of algorithms for state filtering and sequential parameter learning. We show how introducing Markov switching can aid in sequential parameter learning. The state filtering distribution and parameter posteriors then adapt to incoming data that is robust to outlying events. We view existing methodologies, such as sample importance resampling (SIR), particle filtering (PF) and its extension the auxiliary particle filtering (APF) within this framework. To illustrate the performance of our approach we consider two examples, First, the benchmark auto-regressive model with noise. Here we show how IPS can learn the evolution variance with outliers. Secondly, we consider a nonlinear filtering problem with stochastic volatility model. Our method sequential learns the volatility of volatility parameter which has plagued existing methodologies.

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