

Particle filters and variance estimation  
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Particle filters, or sequential Monte Carlo methods, are random algorithms for approximating certain types of integrals that arise in the analysis of data. I will introduce these methods, and present new variance estimators for the resulting approximations that can be computed using a single run of the algorithm. As the number of particles grows, the estimators are weakly consistent for asymptotic variances of the Monte Carlo approximations and some of them are also non-asymptotically unbiased. The asymptotic variances can be decomposed into terms corresponding to each time step of the algorithm, and we show how to estimate each of these terms consistently.