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PARAMETER ESTIMATION IN GENERAL STATE-SPACE MODELS USING PARTICLE METHODS

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Abstract. Particle filtering techniques are a set of powerful and versatile simulation-based methods to perform optimal state estimation in nonlinear non-Gaussian state-space models. If the model includes fixed parameters, a standard technique to perform parameter estimation consists of extending the state with the parameter to transform the problem into an optimal filtering problem. However, this approach requires the use of special particle filtering techniques which suffer from several drawbacks. We consider here an alternative approach combining particle filtering and gradient algorithms to perform batch and recursive maximum likelihood parameter estimation. An original particle method is presented to implement these approaches and their efficiency is assessed through simulation.

Key words and phrases: Optimal filtering, parameter estimation, sequential Monte Carlo, state-space models, stochastic approximation.