SEQUENTIAL MONTE CARLO METHODS FOR DISTRIBUTED BAYESIAN FILTERING ON MANIFOLDS

MARCELO GOMES DA SILVA BRUNO

Many real-world applications require the sequential estimation of state vectors or matrices that evolve on nonlinear manifolds. Furthermore, in many modern engineering systems, multiple agents dispersed over remote nodes of a partially connected network cooperate to execute a common task such as tracking a sequence of hidden states, In this talk, we first review a hybrid parametric/Sequential Monte Carlo implementation of commonly used diffusion methods for distributed Bayesian filtering over networks. Next we present a methodology to extend those methods to filtering on nonlinear manifolds rather than Euclidean spaces. We provide examples with states defined on the unit hypersphere, the Stiefel manifold, and matrix Lie groups such as the Special Orthogonal Group, with applications to communication systens and orientation estimation in rigid body motion.