Parallel probabilistic graphical model approach for nonparametric Bayesian inference

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In this talk, a new approach is introduced into the study of sequential estimation of the state and associated uncertainties of a Markovian system, given noisy observations. The algorithm is characterized by employing multiple probabilistic graphical models to perform parallelized numerical integrations, and to yield a nonparametric Gaussian mixture description of the target distribution. The graph model methodology has been widely used for the solution of sequential data assimilation. Nevertheless, we here proceed to adapt graphical models to underlying dynamical system in order to facilitate a synergetic application of the tools derived from the signal processing and machine learning contexts. As a consequence, a new paradigm for the filtering/smoothing emerges, and meanwhile our work broadens the applicability of graphical model framework for Bayesian inference.