

Department of Decision Sciences

Statistics Seminar

Bridging the particle and ensemble Kalman filters

Hans Rudolf Künsch

Swiss Federal Institute Technology Zurich

Thursday, 30th May 2013

12:30pm Room 3-E4-SR03 Via Röntgen 1 Milano

Abstract

In many applications of Monte Carlo nonlinear filtering, the propagation step is computationally expensive, and hence, the sample size is limited. With small sample sizes, the update step becomes crucial. Particle filtering suffers from the well-known problem of sample degeneracy. Ensemble Kalman filtering avoids this, at the expense of treating non-Gaussian features of the forecast distribution incorrectly. Here we introduce a procedure which makes a continuous transition indexed by a parameter w in $[0, 1]$ between the ensemble and the particle filter update.

We propose automatic choices of the parameter w such that the update stays as close as possible to the particle filter update subject to avoiding degeneracy. In various examples, we show that this procedure leads to updates which are able to handle non-Gaussian features of the prediction sample even in high-dimensional situations.

Joint work with Marco Frei