Νικόλας Κάντας

Lecturer in Statistics, Dept. of Mathematics, Imperial College London

Particle filtering: a survey on the methodology and some extensions that are useful for high dimensional systems

ΠΑΡΑΣΚΕΥΗ 23/12/2016
13:00 – 15:00

**ΑΙΘΟΥΣΑ 607, 6^{ος} ΟΡΟΦΟΣ,
ΚΤΙΡΙΟ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ
(ΕΥΕΛΠΙΔΩΝ & ΛΕΥΚΑΔΟΣ)**

ΠΕΡΙΛΗΨΗ

Particle filtering methodology has been extremely successful in low dimensional nonlinear non-Gaussian applications (e.g Doucet et. al. 01). The basic method uses importance sampling and resampling to propagate samples called particles so that they can approximate a sequence of target distributions. The approach relies on solid theoretical principles and there is a plethora of sharp theoretical results, e.g. (Del Moral 2003). The methodology can be complemented with other powerful ideas, such as tempering, MCMC steps, lookahead strategies. In the first part of the talk we will review the basic methodology and mention some useful extensions. In the second part of the talk we will discuss how the methodology can be applied in high dimensional systems. This has setup been very challenging mainly due to the difficulty to perform importance sampling efficiently in high dimensions (Snyder et. al. 08, Bengtsson et. al. 08, Bui Quang et. al. 10). Despite this challenge a few successful high dimensional particle filtering implementations have appeared recently for data assimilation applications when the hidden signal obeys discrete time dynamics (Chorin et. al. 09, Papadakis et. al. 10, Reich 13, Van Leeuwen 10, 12, Weare 09). If time permits, we will present joint ongoing work (with A. Beskos, D. Crisan, A. Jasra, F. Pons-Llopis) for addressing problems where the signal of interest obeys continuous time dynamics and in particular is modelled by a dissipative stochastic PDE that is observed at discrete times with additive noise.

Nikolas Kantas

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13:00 – 15:00

**ROOM 607, 6th FLOOR,
POSTGRADUATE STUDIES BUILDING
(EVELPIDON & LEFKADOS)**

ABSTRACT

Particle filtering methodology has been extremely successful in low dimensional nonlinear non-Gaussian applications (e.g Doucet et. al. 01). The basic method uses importance sampling and resampling to propagate samples called particles so that they can approximate a sequence of target distributions. The approach relies on solid theoretical principles and there is a plethora of sharp theoretical results, e.g. (Del Moral 2003). The methodology can be complemented with other powerful ideas, such as tempering, MCMC steps, lookahead strategies. In the first part of the talk we will review the basic methodology and mention some useful extensions. In the second part of the talk we will discuss how the methodology can be applied in high dimensional systems. This has setup been very challenging mainly due to the difficulty to perform importance sampling efficiently in high dimensions (Snyder et. al. 08, Bengtsson et. al. 08, Bui Quang et. al. 10). Despite this challenge a few successful high dimensional particle filtering implementations have appeared recently for data assimilation applications when the hidden signal obeys discrete time dynamics (Chorin et. al. 09, Papadakis et. al. 10, Reich 13, Van Leeuwen 10, 12, Weare 09). If time permits, we will present joint ongoing work (with A. Beskos, D. Crisan, A. Jasra, F. Pons-Llopis) for addressing problems where the signal of interest obeys continuous time dynamics and in particular is modelled by a dissipative stochastic PDE that is observed at discrete times with additive noise.