Mean Field Methods for Stochastic Dynamics

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Abstract

Mean field methods provide approximations to marginal densities of multivariate probability distributions. Originally developed in statistical physics they have become popular also in the field of machine learning as efficient approximations to probabilistic inference. In this talk I will present derivations of such methods using a variational approach and their application to stochastic dynamical models e.g. coupled stochastic differential equations.

More refined mean field techniques can be obtained from 'cavity' approaches developed in the statistical physics of disordered systems. In the static case, such methods lead to typically very accurate message passing algorithms which have been used for Bayesian inference. I will discuss possibilities of extending such methods to the case of stochastic dynamics.