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<http://niasra.uow.edu.au/cei/people/UOW202823.html>

Title:

Sparse approximate inference for spatio-temporal point process models with application to armed conflict

Abstract:

Spatio-temporal log-Gaussian Cox process models play a central role in the analysis of spatially distributed systems in several disciplines. Yet, scalable inference remains computationally challenging both due to the high resolution modelling generally required and the analytically intractable likelihood function. In this talk I will demonstrate a novel way for solving this problem, which involves combining ideas from variational Bayes, message passing on factor graphs, expectation propagation, and sparse-matrix optimisation.

The proposed algorithm is seen to scale well with the state dimension and the length of the temporal horizon with moderate loss in distributional accuracy. It hence provides a flexible and faster alternative to both non-linear filtering-smoothing type algorithms and approaches that implement the Laplace method (such as INLA) on (block) sparse latent Gaussian models. I demonstrate its implementation on simulation studies point-process observations, and use it to describe micro-dynamics in armed conflict in Afghanistan using data from the WikiLeaks Afghan War Diary.

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