



# Sparse approximations in spatio-temporal point-process models

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Analysis of spatio-temporal point patterns plays an important role in several disciplines, yet inference in these systems remains computationally challenging due to the high resolution modelling generally required by large data sets and the analytically intractable likelihood function. Here, we exploit the sparsity structure of a fully-discretised log-Gaussian Cox process model by using expectation constrained approximate inference. The resulting family of expectation propagation algorithms scale well with the state dimension and the length of the temporal horizon with moderate loss in distributional accuracy. They hence provide a flexible and faster alternative to both the filtering-smoothing type algorithms and the approaches which implement the Laplace method or expectation propagation on (block) sparse latent Gaussian models. We demonstrate the use of the proposed method in the reconstruction of conflict intensity levels in Afghanistan from a WikiLeaks data set.

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