

Dynamic spatio-temporal point-process modelling with application to violent conflict

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Statistical analysis of space-time data is becoming increasingly common in several science and engineering fields, yet modelling and estimation when the data constitutes a set of point-process observations remain challenging tasks. In the talk I will focus on the use of point-process statistics for tackling related issues and show how clustering behaviour and the association between point patterns across time may be used for dimensionality reduction. These nonparametric methods allow for the formulation of low-rank models to which standard fast deterministic Bayes approximation methods may be applied for inference. As a case study I will consider the modelling and prediction of violent activity in Afghanistan using the WikiLeaks Afghan War Diary. The talk will conclude with ideas relating to future work, in particular the potential of finite element methods for sparse formulations in dynamic spatiotemporal models and the application of agent trajectory planning in a spatiotemporal point-process context.