The use of spatio-temporal ecological models in predictive policing.

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Keywords: predictive policing, point pattern, log-Gaussian Cox process, spatio-temporal point processes

Abstract:

While most ecological processes take place in in time and space an increasing number of spatio-temporal data are being collected, existing spatio-temporal modelling methods are often lacking the flexibility that is necessary for the use with real data. This poster presents an approach to constructing flexible spatio-temporal point process models based on the stochastic partial differential equation (SPDE) approach introduced by Lindgren et al. 2011. In particular, we will construct a class of spatio-temporal log-Gaussian Cox processes.

The models' flexibility does not only allow us to construct realistically complex models relevant to specific ecological data sets on habitat preference, say, but also to extend their use to the many other data structures, such as those derived from criminology. We will discuss differences and similarities between structures in ecological data and data detailing the locations of crime events. The development of such models will identify environmental, and socio-economic factors that encourage crime, aiding evidenced based policing but will also provide new tools for spatio-temporal modelling in the context of ecological data.

References:

Lindgren, F., Rue, H. & Lindström, J. (2011). An explicit link between Gaussian fields and Gaussian Markov random fields: The stochastic partial differential equation approach (with discussion). Journal of the Royal Statistical Society. Series B. Statistical Methodology 73, 423–498.