

Modelling road traffic collisions in EDINBURGH using spatio-temporal models



with various R packages including *inlabru*, *geostatsp* and *spatstat*

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Models used: Log Gaussian Cox Processes

Log Gaussian Cox Processes are Cox processes which possess a *log Gaussian random field*. **Cox Processes** are doubly stochastic: having a *Poisson process* and a *random field*. A point pattern x , with n points, follows a Log Gaussian Cox process such that:

$$x \sim e^{-\Lambda \prod_{i=1}^n \lambda(x_i)}$$

where the intensity function is denoted by $\lambda(\cdot) = \beta_0 + \zeta(\cdot)$ with $\zeta(\cdot)$ and β_0 representing a spatial random field and intercept term respectively. The covariate considered in this study is **speed limit**.

What is the impact of speed limits on the distribution of road traffic collisions in Edinburgh?

Modelling points in space and time simultaneously

Data: Multi-type point patterns

Fig1: Locations of road traffic collisions in Edinburgh from 2014:2017

Model assessment

This will be achieved by comparing the local pair correlation function for the observed data with that of 10,000 instantiations of the final model selected (see Fig. 2).

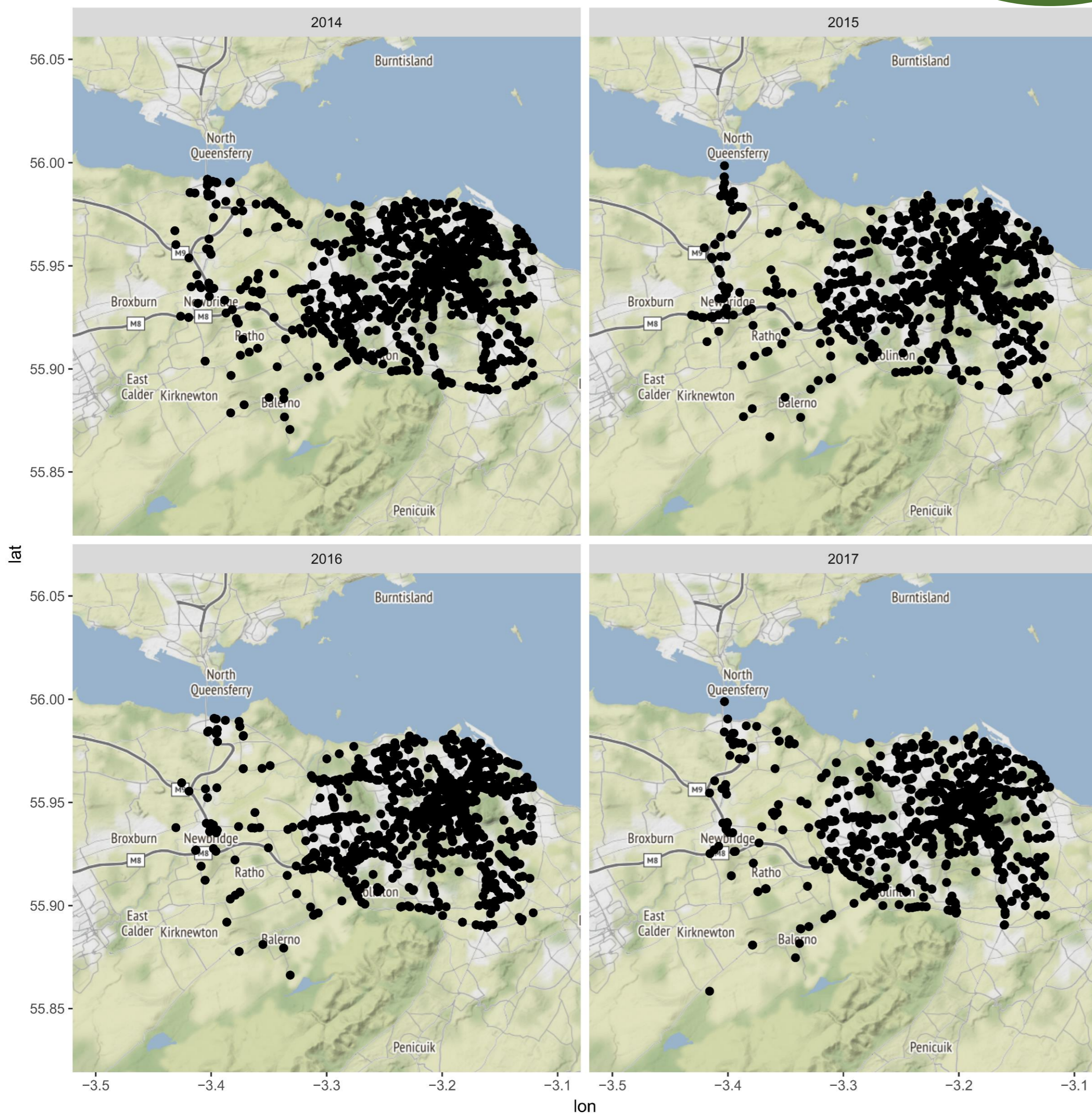
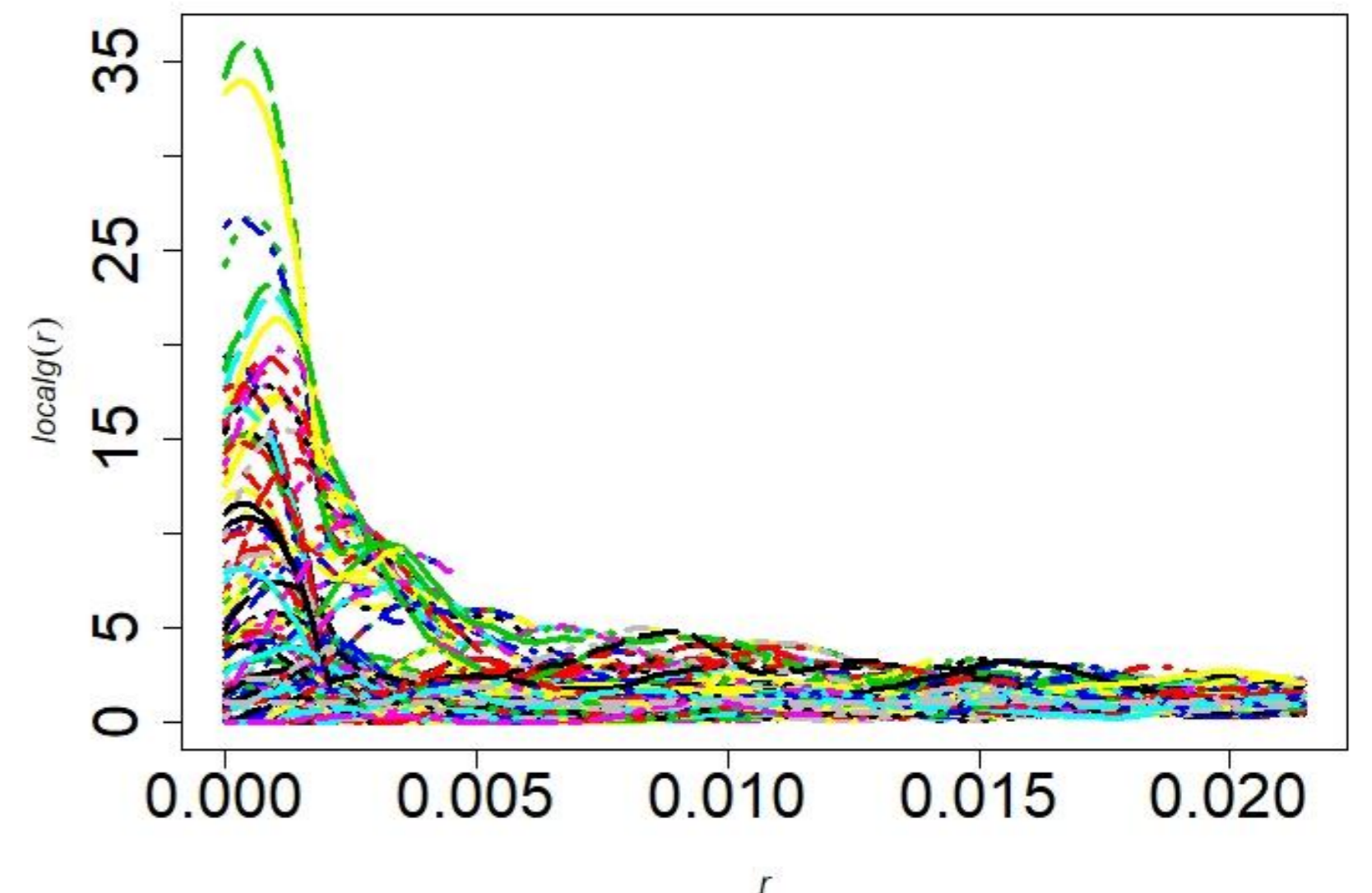


Fig 2: Local pair correlation functions for collisions data



Mesh and prior sensitivity tests

Mesh and prior sensitivity tests will be done to assess the sensitivity of the results to mesh size and to prior specifications (see Fig. 4).

Fig 4: Sample of meshes considered in analyses

Data exploration

Fig 3: Road traffic collisions in Edinburgh from 2017 by (a) speed limit and (b) severity

