Fast and scalable non-parametric Bayesian inference for Poisson point processes

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Abstract. In this talk, I will consider the problem of non-parametric Bayesian estimation of the intensity function of a Poisson point process. The observations are assumed to be n independent realisations of a Poisson point process on the interval $[0, T]$. The intensity function is modelled a priori as piecewise constant on N bins forming a partition of the interval $[0, T]$, and the prior distribution on the coefficients of the intensity function is defined by a Gamma Markov chain. The posterior distribution is not available in closed form, but statistical inference can be performed using a straightforward version of the Gibbs sampler. The approach scales well with the sample size and is robust with respect to the choice of the bin number N. I will demonstrate practical performance of the method via synthetic data examples. Furthermore, I will show its application on the US mass shootings data.

References

[1] Shota Gugushvili, Frank van der Meulen, Moritz Schauer, and Peter Spreij (2019).