

Bayesian Inference for Neyman-Scott Point Processes with Anisotropic Clusters

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Abstract

There are few inference methods available to accommodate covariate-dependent anisotropy in point process models. To address this, we propose an extended Bayesian MCMC approach for Neyman-Scott cluster processes. We focus on anisotropy and inhomogeneity in the offspring distribution. Our approach provides parameter estimates as well as significance tests for the covariates and anisotropy through credible intervals, which are determined by the posterior distributions. Additionally, it is possible to test the hypothesis of constant orientation of clusters or constant elongation of clusters. We demonstrate the applicability of this approach through a simulation study for a Thomas-type cluster process and an application to real-world data.