On minimum contrast method for multivariate stationary spatial point processes

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Abstract

The minimum contrast (MC) method, as compared to the likelihood-based methods, is a computationally efficient method for estimation and inference of point processes. This advantage becomes more pronounced when working with complex point process models, including Log-Gaussian Cox Process (LGCP). Despite its practical importance, there is very little work on the MC method for multivariate point processes. The aim of this paper is to introduce a new MC method for parametric multivariate stationary spatial point patterns. A contrast function is calculated based on the entry-wise sum of squares of the difference between the estimated K-function matrix and the conjectured K-function matrix. Under regular assumptions, consistency and asymptotic normality of the MC estimator are derived. The performance of the proposed method is illustrated with simulations and a real data analysis of the Global Terrorism Database (GTD) dataset.

Keywords: Linear Model of Coregionalization; Log-Gaussian Cox process; Minimum contrast method; Multivariate spatial point process