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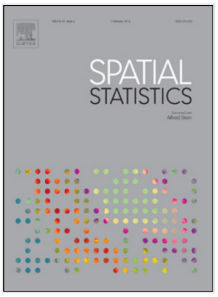

Local composite likelihood for spatial point processes

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Local composite likelihood for spatial point processes

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Abstract

We develop a general approach to spatial inhomogeneity in the analysis of spatial point pattern data. The ideas of local likelihood (or 'geographically weighted regression') are applied to the composite likelihoods that are commonly used for spatial point processes. For Poisson point processes, local likelihood is already known; for Gibbs point processes we develop a local version of Besag's pseudolikelihood; for Cox point processes and Neyman-Scott cluster processes we develop a local version of the Palm likelihood of Ogata and Katsura. Using recent results for composite likelihood and for spatial point processes, we develop tools for statistical inference, including intensity approximations, variance estimators, localised tests for the significance of a covariate effect, and global tests of homogeneity. Computationally efficient approximations are available using the Fast Fourier Transform. We develop methods for bandwidth selection, which may also be useful for smoothing dependent spatial data. There are mathematical connections to existing exploratory methods such as the scan statistic, local indicators of spatial association, and point process residuals. The methods are demonstrated on three example datasets, and R code is supplied.

Keywords: bandwidth selection, geographically weighted regression, logistic regression, Palm likelihood, point process residuals, pseudolikelihood.
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