Ann Inst Stat Math (2017) 69:303–331
DOI 10.1007/s10463-015-0536-7

Median-based estimation of the intensity of a spatial point process

Jean-François Coeurjolly[1]

Received: 7 October 2014 / Revised: 15 June 2015 / Published online: 4 August 2015

Abstract This paper is concerned with a robust estimator of the intensity of a stationary spatial point process. The estimator corresponds to the median of a jittered sample of the number of points, computed from a tessellation of the observation domain. We show that this median-based estimator satisfies a Bahadur representation from which we deduce its consistency and asymptotic normality under mild assumptions on the spatial point process. Through a simulation study, we compare the new estimator, in particular, with the standard one counting the mean number of points per unit volume. The empirical study confirms the asymptotic properties established in the theoretical part and shows that the median-based estimator is more robust to outliers than standard procedures.

Keywords Cox processes · Robust statistics · Sample quantiles · Bahadur representation

✉ Jean-François Coeurjolly
Jean-Francois.Coeurjolly@upmf-grenoble.fr

[1] Laboratory Jean Kuntzmann, Univ. Grenoble Alpes, 51 Rue des Mathématiques Campus de Saint Martin d'Hères, BP 53, 38041 Grenoble Cedex 09, France