

Diggle, Peter

A kernel method for smoothing point process data. (English) Zbl 0584.62140
J. R. Stat. Soc., Ser. C 34, 138-147 (1985).

Let (x_1, \dots, x_n) be a sample of a point process observed on $(0, T)$. The author considers smoothing of these data by a kernel in the following way

$$\hat{\lambda}_t(x) = \sum_{i=1}^n \delta(|x - x_i|/t) / \int_0^T \delta(|x - u|/t) du$$

where δ is a symmetric density. In the case of a Cox process $\hat{\lambda}_t(x)$ is an estimate of the underlying realization of the rate process. It is not quite clear what $\hat{\lambda}_t(x)$ estimates for a general point process, but it can serve as a useful tool for the explanatory analysis of the heterogeneity of an observed process.

The paper gives a procedure for the selection of the bandwidth t . In the case of a Cox process the mean-square-error $M(t) = E((\hat{\lambda}_t(x) - \lambda(x))^2)$ can be expressed for uniform δ in terms of the intensity μ and the reduced second moment measure K . The procedure selects t by minimizing $\hat{M}(t)$ obtained from $M(t)$ by substituting the usual estimators $\hat{\mu}$ and \hat{K} for μ and K . The method is illustrated by simulated data and some real data on joints along a coal seam.

Reviewer: [H.R.Künsch](#)

MSC:

- [62M09](#) Non-Markovian processes: estimation
- [62G05](#) Nonparametric estimation
- [93E14](#) Data smoothing in stochastic control theory
- [60G55](#) Point processes (e.g., Poisson, Cox, Hawkes processes)
- [62M20](#) Inference from stochastic processes and prediction

Cited in **58** Documents

Keywords:

local intensity; correction for end-effects; density estimation; smoothing; kernel; Cox process; heterogeneity; selection of the bandwidth; mean-square-error; reduced second moment measure

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