OPTIMISATION OF LINEAR UNBIASED INTENSITY ESTIMATORS FOR POINT PROCESSES

Tomáš Mrkvička[1]* and Ilya Molchanov[2]

[1] *Mathematical Department, Pedagogical Faculty, University of South Bohemia, Jeronýmova 10, 17001 České Budějovice, Czech Republic*
[2] *Department of Mathematical Statistics and Actuarial Science, University of Bern, Sidlerstrasse 5, CH‿ 3012 Bern, Switzerland*

Abstract. A general non-stationary point process whose intensity function is given up to an unknown numerical factor λ is considered. As an alternative to the conventional estimator of λ based on counting the points, we consider general linear unbiased estimators of λ given by sums of weights associated with individual points. A necessary and sufficient condition for a linear, unbiased estimator for the intensity λ to have the minimum variance is determined. It is shown that there are "nearly" no other processes than Poisson and Cox for which the unweighted estimator of λ, which counts the points only, is optimal. The properties of the optimal estimator are illustrated by simulations for the Matérn cluster and the Matérn hard-core processes.

Key words and phrases: Intensity estimation, Poisson process, linear estimators, Matérn cluster process; Matérn hard-core process.