Supervisor's Report on Diploma Thesis

Second-order characteristics of point processes

ARCHIT GUPTA

The submitted thesis is focused on one of the most important summary characteristics for spatial point processes, namely the K-function. The classical Ripley's K-function looks at the pairs of points within certain Euclidean distance. In this thesis its multiparameter extension is also investigated. It is assumed that a single realization of a stationary point process is observed in some bounded window. When estimating the K-function, edge effects arise because one of the points in a pair could fall outside the window. The author considers several nonparametric estimators of the K-function that cover the most commonly used methods of edge correction.

The main contribution of this thesis is the calculation of bias and variance for different edge-corrected estimators in the case of planar Poisson point process. The author performed a simulation study where these theoretical computations are compared with variance approximations that have been proposed in the literature. These aims were stated in the assignment of diploma thesis. Therefore, I may claim that the assignment requirements have been fulfilled.

The topic required a lot of technical calculations. The student worked hard to evaluate all the integrals in detail. In the text necessary steps and main results are presented in a transparent way. The results derived in Chapter 2 are formulated as theorems. The thesis contains rigorously formulated mathematical text and it can be said that its mathematical level is very good.

The bibliographic sources are properly cited. The formal arrangement of the thesis is satisfactory.

Archit put a lot of effort into finishing this thesis. He showed that he is able to work systematically and with his own initiative. Maybe some parts would require more time to elaborate the details. However, the overall impression from the thesis is very good.

In conclusion, I recommend the thesis of Archit Gupta to be accepted as a diploma thesis at Charles University, Faculty of Mathematics and Physics.

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