

Functional summary statistics for the Johnson-Mehl model

May 4, 2013

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Abstract

The Johnson-Mehl germination-growth model is a spatio-temporal point process model which among other things have been used for the description of neurotransmitters datasets. However, for such datasets parametric Johnson-Mehl models fitted by maximum likelihood have yet not been evaluated by means of functional summary statistics. This paper therefore invents four functional summary statistics adapted to the Johnson-Mehl model, with two of them based on the second-order properties and the other two on the nuclei-boundary distances for the associated Johnson-Mehl tessellation. The functional summary statistics theoretical properties are investigated, non-parametric estimators are suggested, and their usefulness for model checking is examined in a simulation study. The functional summary statistics are also used for checking fitted parametric Johnson-Mehl models for a neurotransmitters dataset.

Key words: germination-growth process, model checking, neurotransmitters, pair correlation function, spatio-temporal point process, tessellation, typical cell.