
Markovian approximation of a hidden Hawkes process for epidemic propagation modelling

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Résumé

In recent years, numerous studies grounded on Hawkes processes have been carried out in many fields including finance, biology and social network. Hawkes processes form a class of self-exciting simple point processes. In this communication, I will introduce a Markovian approximation of a specific hidden multivariate Hawkes process considered in a spatial setting and used to model the spatio-temporal spread of an epidemic. The spatial domain is composed of multiple disjoint regions. The baseline intensity is time-dependent, and the jump size is constant and equal to 1. Furthermore, the exciting function is a general one. The closed-form expression of the multivariate characteristic function of such a Markovian process will be presented. This allows us to obtain a closed-form formula for the temporal structure of the first moments. I will also discuss other points such as parameter estimation of the state-space epidemic model by Sequential Monte-Carlo.

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