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Stochastic modelling of an infectious disease outbreak

There are many ways to model an infectious disease outbreak. Hawkes processes are a class of self-exiting processes that can be used in numerous applications to model event clustering and causal inference. In spite of their simple formulation, this class of processes can model quite complex phenomena. While most literature on Hawkes processes refers to continuous-time processes, there are discrete-time variants that can be viewed as stochastic versions of popular compartmental models used in epidemiology. Due to its flexibility, Hawkes processes are a good alternative to model disease outbreaks with public health interventions and other time-dependent covariates. In this presentation, we discuss the link/equivalence between variants of SIR models and Hawkes processes to model Covid-19 in small populations.