

Prequel to Hawkes Processes: An Overview of Temporal and Spatio-Temporal Point Processes and Some Simulations

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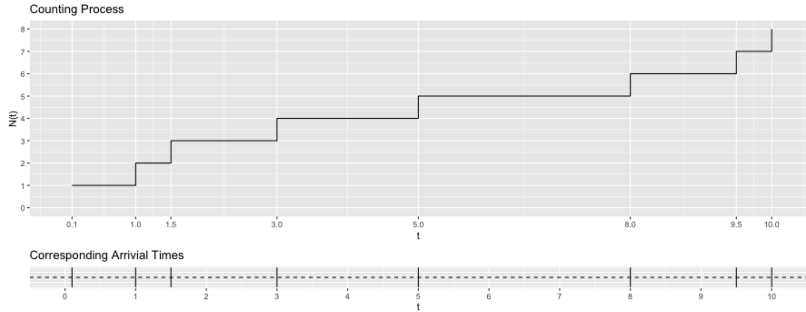
June 2021

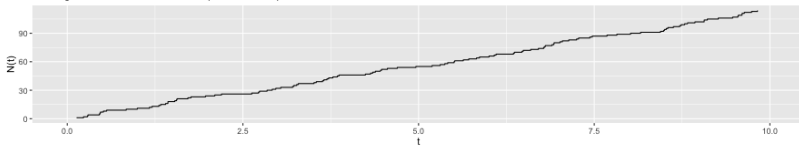
Background and Objectives

Introductions, Definitions, Properties, and Graphs

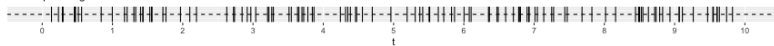
1. Counting process
2. HPP
3. NPP
4. Cox and Cluster processes
5. Hawkes process
6. Spatio-temporal self-exciting point process

Counting Process

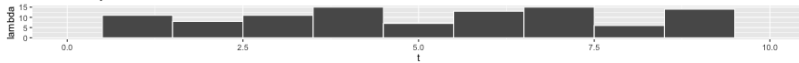


Homogeneous Poisson Process ($\lambda = 10$)

Corresponding Inter-Arrival Times

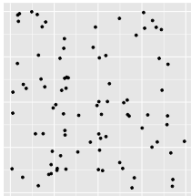


Rate/Intensity

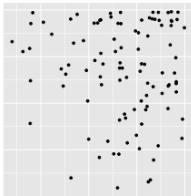


HPP vs. NPP vs. Cox vs. Matern in 2D

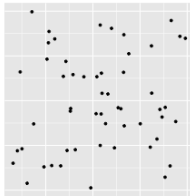
HPP (rate = 100)



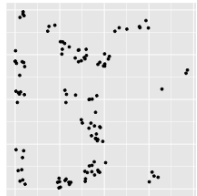
NPP



Cox Process



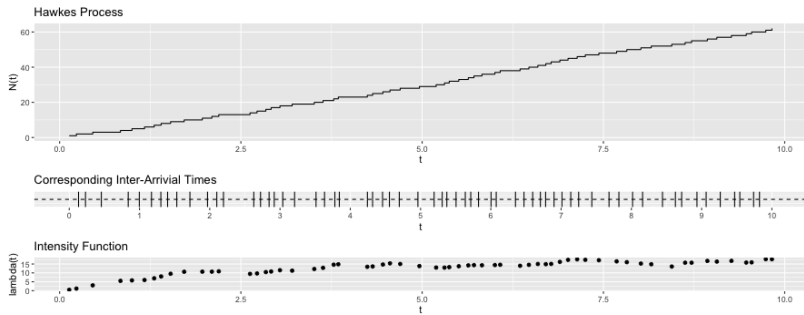
Matern Process



NPP

Cox and Cluter Processes

Hawkes Process



Spatio-temporal Self-exciting Point Process

Acknowledgments