Exact Simulation of Self-Excited Point Process with Levy Driven OU

Yan Qu.
London School of Economics.

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Abstract
We introduce a new large family of self-excited point process with non-Gaussian Levy driven Ornstein-Uhlenbeck (OU processes). We characterise the distributional properties of this new class of point processes and the associated intensity processes, and develop efficient sampling methods for generating sample paths for these processes exactly. In particular, we focus on exploiting typical specifications of Levy processes such as the Gamma process and the tempered stable subordinator, where remarkably the resulting intensity process and point processes can be analytically decomposed into several types of basic components, each of which can be simulated exactly simulated, either directly or via an acceptance and rejection scheme. Even though the underlying process processes a complex structure, neither truncation nor discretization are required. Extensive numerical experiments and tests are reported to demonstrate the accuracy and effectiveness of our schemes.