

Department of Decision Sciences

## A spatiotemporal urn-based shock model for studying infectious and interacting phenomena

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### Abstract

In this paper we introduce a new urn model for the study of infectious and interacting phenomena, i.e. cascading failures.

We consider a network of interacting urns displaced over a grid or lattice: every urn is Polya-like and its reinforcement rule is function of time (time contagion), of the behavior of the neighboring urns (spatial contagion), and of a random component, which can both represent simple fate, but also the impact of exogenous factors.

The framework we present is quite general and can be used, in our opinion, to study different phenomena: the spreading of flu, joint defaults in the financial systems, power outages, etc.

The paper provides theoretical results and also a first simulation.