

Understanding patterns in urban crime - from agent based models to PDEs

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Abstract:

Agent based models have been used for some time by social scientists in an attempt to understand certain aspects of human behavior. However, these models are often quite intricate and not especially suitable to mathematical analysis. In this talk, I will present a more simple agent based model, specifically for certain types of urban crime, that is amenable to mathematical analysis. The model presented will be discussed first in its agent based form, then passed to a continuum limit to a set of PDEs, and analyzed again in PDE form. This model helps explain several interesting observations about spatio-temporal patterns in crime. If time permits, we will also discuss how a version of this model can be used to tackle the "geographic profiling" problem: from the locations of a set of crimes perpetrated by the same offender, can you probabilistically determine where the offender lives?