

SFI REU PROJECT DESCRIPTION  
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The term crime wave is often used qualitatively in everyday discourse. Is it possible to quantitatively study and verify their existence? Much work has been done studying contagion models and diffusion across biological and social networks with SIR model used in epidemiology. Luis Bettencourt has put forth an extension of the SIR model which allows for the estimation of the reproduction number ( $R_0$ ) based on daily case data [1]. With the use of crime data from the city of Philadelphia provided by Nathan Eagle I would like to apply this technique to quantify a crime wave. By tracking crimes across the city, is it possible to define a reproduction number for various crimes? Understanding contagion mechanisms is important, but ultimately, the goal is to find an anecdote. What is the best way to spread this anecdote across a network, and spread it faster than the disease? I would like to explore the diffusion of information across communication networks in parallel with the disease (eg. information about a new flu virus spreading parallel to the virus itself) as well as ways to optimize the spread of cures across the original network (eg. can police respond quickly enough to block a crime wave).

References:

[1] Luis M. A. Bettencourt and Ruy M. Ribeiro. Real time bayesian estimation of the epidemic potential of emerging infectious diseases. PLoS ONE, 3(5):e2185, 05 2008.