Effects of Natural Disasters on Spatio-Temporal Patterns Of Crime Types in the United States

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Dynamic Patterns of Criminal Activity

SUMMARY

The relationship between disasters and crime patterns is not well understood, making it difficult to confirm under what circumstances crime rates increase, decrease, or remain unchanged following a disaster event. State and local law enforcement need a better understanding of this relationship to fulfill their duties during and after a disaster, when public safety resources are the most strained. This project studies spatiotemporal changes across multiple crime types/crime rates following disaster events with variable intensity, leading to increased predictive analysis capabilities for public safety departments and agencies.

PROBLEM STATEMENT

Natural disasters and other climate-related threats pose a significant challenge to communities and human livelihood worldwide. These types of events are increasingly more frequent and severe. Thus, it is becoming apparent that, as exposure to natural hazards increases, understanding of emerging spatiotemporal distributions of crime patterns will be necessary for appropriate and effective allocation of law enforcement resources. In this study, we intend to investigate the spatiotemporal changes across multiple crime rates following manifestations of a variety of natural hazards with different magnitudes in the United States.

APPROACH

We propose a spatial discontinuity regression approach to statistically quantify the change in crime rates following extreme events. The discontinuity regression approach has been used extensively in medical research to compare a treatment group, who received an intervention or treatment, to a control group that did not. Thus, in our context, disaster events act as a type of environmental intervention or treatment effect, with resulting impact on crime patterns.

ANTICIPATED IMPACT FOR DHS

Our research will address the DHS CINA challenge area of analyzing dynamic patterns of criminal activity. Our work will exemplify how diverse detailed datasets compiled from a variety of reports and sources can be leveraged to study particularly difficult problems that have evaded in-depth understanding thus far. The proposed spatiotemporal model should allow for more nuanced pattern detection in criminal activities following disaster events than was possible in the past. In addition, our approach allows for study at a variety of temporal scales.