



THE UNIVERSITY OF CHICAGO

Department of Statistics

MASTER'S THESIS PRESENTATION

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Forecasting Violent Crimes at Fine Grained Resolution

THURSDAY, February 9, 2017, at 12:30 PM
Jones 308, 5747 S. Ellis Avenue

ABSTRACT

Analyzing and understanding crime patterns has long been an important topic, as it can be helpful for the policymakers and law enforcement agencies to take actions to prevent crime cases. Thanks to the enormous resources of crime data nowadays, many efforts have been made towards using data to better understand the crime patterns. However, such research results can hardly be directly applied at an operationally actionable level as they mainly focus on analyzing the crime patterns at a coarse spatial and temporal resolution.

The main challenges of obtaining crime predictions at the desired resolution come from two aspects: First, the available data is not sufficient to get a high prediction accuracy at a fine spatial and temporal resolution. Secondly, when focusing on small spatial and temporal resolution, the data is extremely unbalanced as violent crime cases are usually rare events. It is hard for the existing methodologies to extract useful patterns from the data.

In this work, we try to address these problems by applying a biased subsampling method and a spatial smoothing technique to the models. We demonstrate that using only publicly available data, including the weather forecast data and historical crime data, we can achieve reasonable predictions of shooting cases with sufficient spatial and temporal precision to allow for realistic target response. Although these methods still require further exploration to reach a desired level of accuracy before being operationally actionable, this work shows a possible direction to address such problems.

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