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Early Results
DA 401
Due Date: March 29, 2019

**Title:**

Investigating the Evolution of Crime/Gang Activity in Chicago

## Introduction

Gang violence has been a prominent source of Chicago crime in recent years. With the inclusion of arson, assault, homicide, theft, the list goes on with the identified crimes associated with gangs. As the city continues to strive to reduce crime with the usage of technology and predictive analytics, this study seeks to aid in this battle on crime through a fight with gang violence. In an effort to combat gang violence, we shall investigate the evolution of crime and gang activity in Chicago in recent years to identify how potential patterns have impacted the city. By determining the patterns of crime within Chicago, we seek to learn of the types of crimes performed by specific gang's and their occurrence throughout the city.

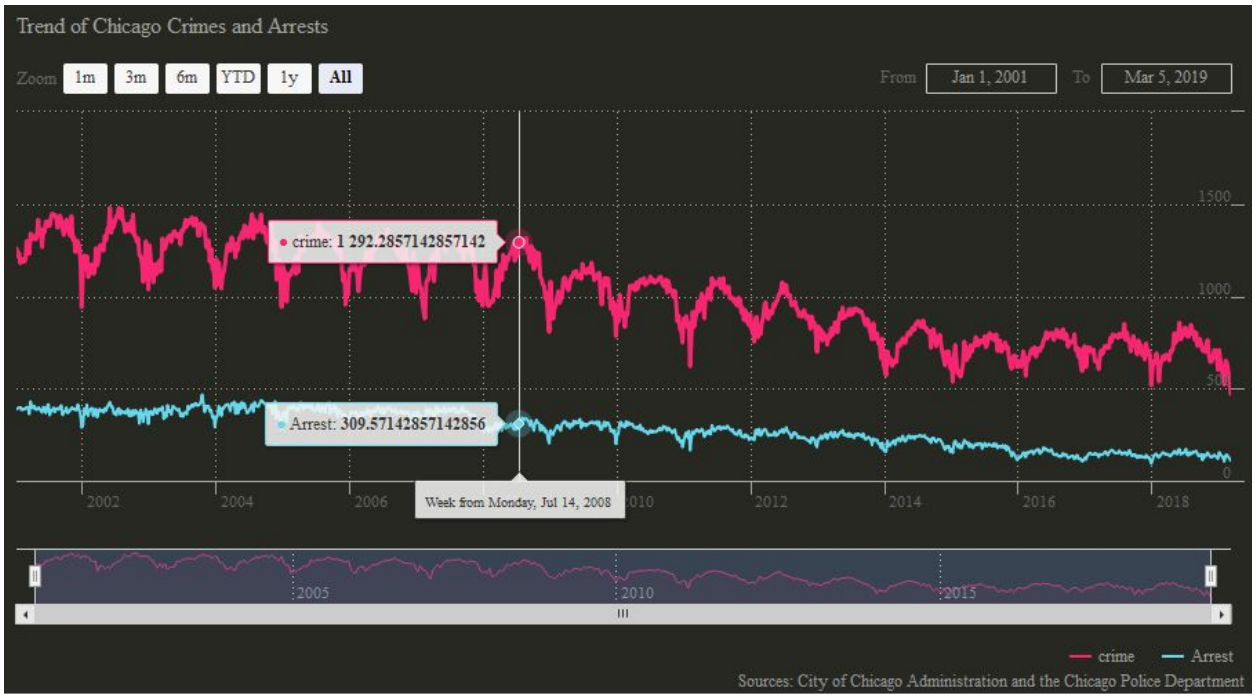
## Material and Methods

Within this investigation, two Chicago data sets will be utilized: Crimes - 2001 to present and the Investigatory Stop Reports (ISR) data set provided by the Chicago Police Department. The 2001-present data shall enable this study to investigate whether crimes have become stagnant or have changed in areas throughout recent years. By using both the social and geographical information provided, a more robust analysis will be conducted through the incorporation of clustering analysis will aid in this historical review of crime. (Gennip, 2012) Furthermore, the ISR data set will provide more detailed information regarding gang activity, ultimately aiding in the analysis of gang activity in Chicago from 2016-2018.

Thus far within our preliminary analysis we have been able to gather descriptive statistics regarding the categorical and nominal factors within our data. Additionally, we have begun our time-series analysis regarding the number of crimes and arrests within Chicago, and will further investigate methods of forecasting (predicting) the possible number of crimes in the future. At this point in time we shall begin numerous methods of hierarchical clustering, and the implementation of geospatial analysis to recognize patterns within our data. Currently, we have been able to observe patterns of where the top six occurat crimes in Chicago take place (typically on the West-side, Downtown, and South-side).

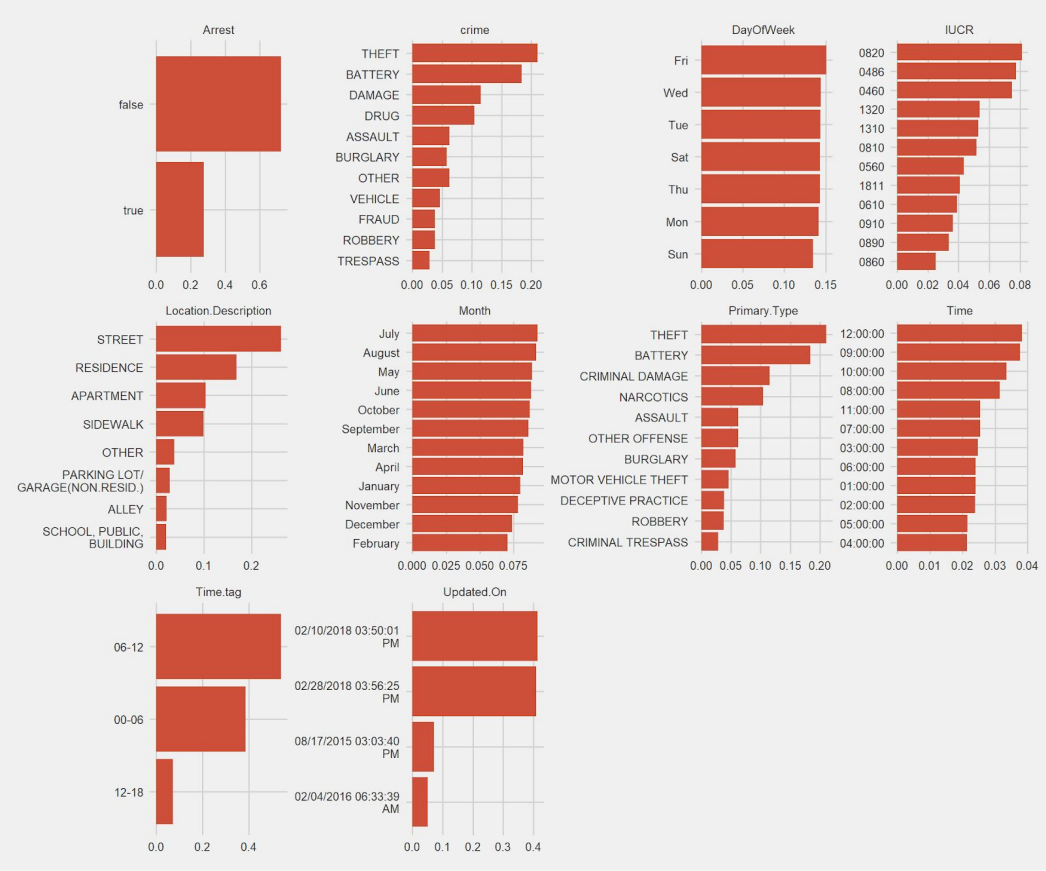
Furthermore shall attempt to perform geo-statistical clustering techniques to identify the forms of gang activity found in neighborhoods. Thereby creating a modeling for the identification of gang activity throughout the city of Chicago to crack down on gang crime. Overall, this study will aid in the reduction of crime within Chicago and aim towards developing a distinctive tool for visualizing types of gang activity in Chicago. Thus, presenting a tool to Chicago police to identify areas prone to gang activity throughout the city.

## Early Results / Visuals

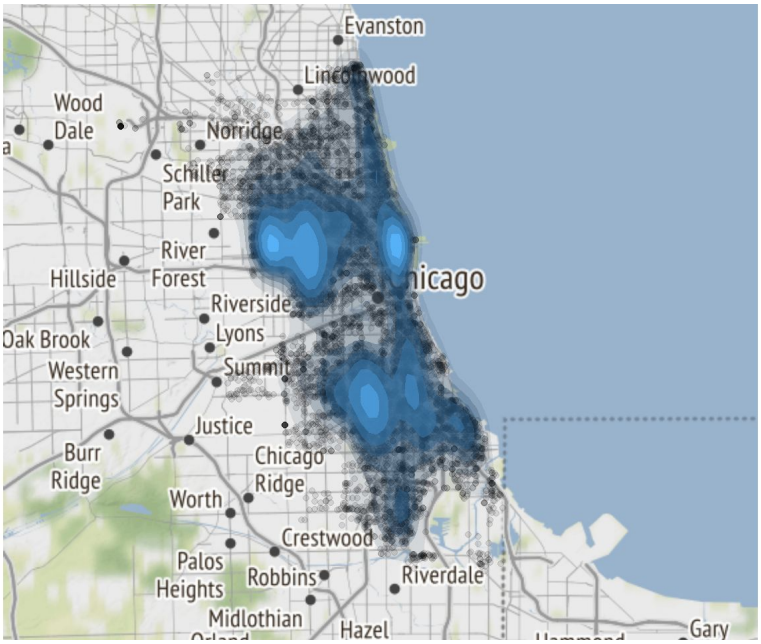


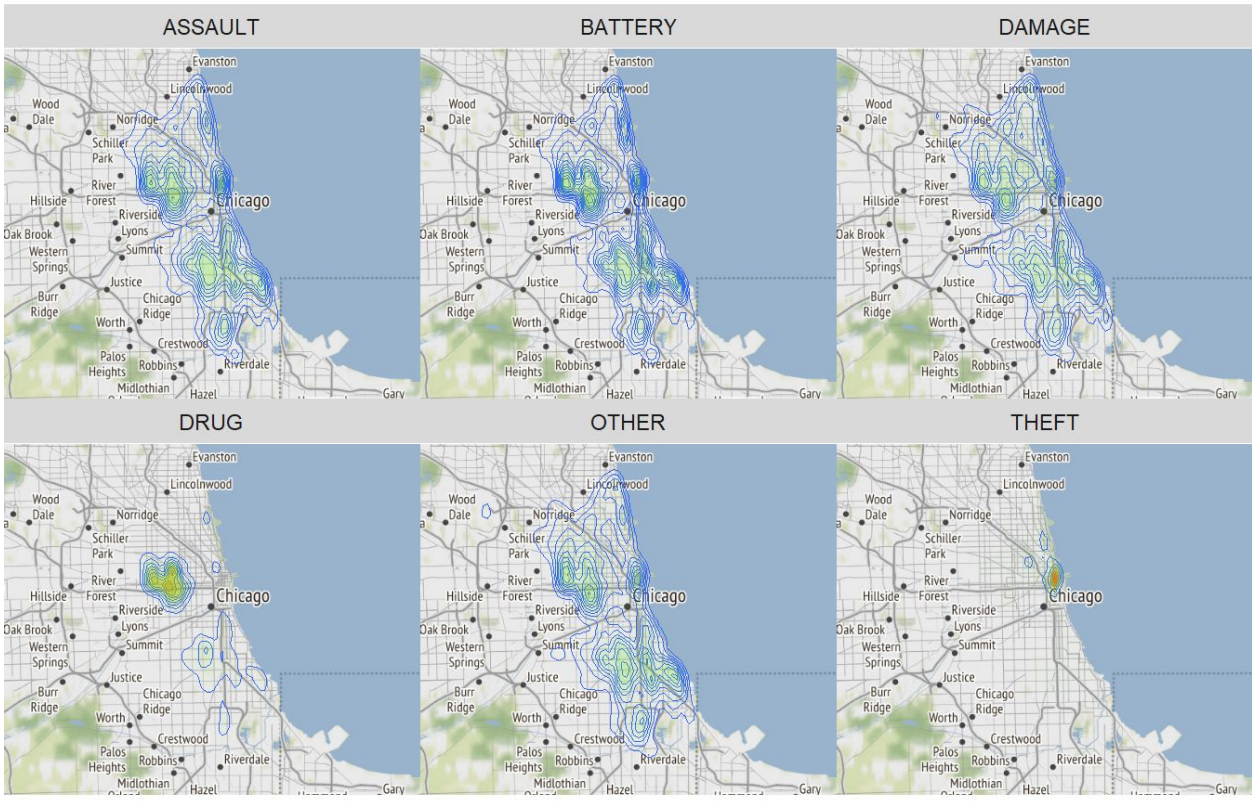

Based on our time-series data we have been able to depict the rate of crime that has occured in Chicago from 2001 to present day, along with the rate of arrest. This visualization provides support for Chicago's Police claims of reducing crime in over the past decade. However, from our analysis we have found that even though the crime rate as decrease, the rate of arrest apparently has has little decrease and is practically constant over the years. From this gathered knowledge our investigate will continue to study which police district are tacking specific crimes over the years

```
##    Category Frequency Percentage
## 1    THEFT   1420555 0.21046790
## 2  BATTERY   1239979 0.18371396
## 3   DAMAGE    774861 0.11480257
## 4     DRUG    705793 0.10456953
## 5  ASSAULT    422157 0.06254633
## 6    OTHER    420596 0.06231505
```




This visualization allows us to recognize the top categorical factors within the data set and gain an elementary understanding of the areas that Chicago police should concentrate on for recognizing crime patterns.




The two visualization above depict the density of crime within areas of Chicago. From the first image we are able to see that there is a crime practically everywhere in Chicago, except not as much within the middle areas of the city. Meanwhile, when identifying the top six crime

types in Chicago, we find that crime is majority based on the West-side, Downtown, and South-side areas of the city. This information is commonly known based on these areas typically having the more impoverished population and issues. Our analysis will continue is this areas while performing clustering and geo-spatial techniques to identify more patterns and prediction for future crime in these areas.

## References

Yves van Gennip, et al. (2013), Community Detection Using Spectral Clustering on Sparse Geosocial Data. SIAM Journal on Applied Mathematics, vol. 73 (1): 67 doi: 10.1137/120882093