



Statistical Approaches for Analyzing Crime Rates in Chicago from 2012 - 2017

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Background

- The dataset covers crime data from the Chicago area from 2012 – 2017
- Our research covers crimes ranging from stalking to assault and also takes note of where the crime was committed, whether the crime was convicted or not and whether the crime was domestic or not
- The dataset is subset of Chicago crime data from 2002 – 2017, but chose to use 2012 – 2017 because it was more recent data and more relevant to the political climate

Acknowledgements

Our team thanks our professor Matey Neykov for his guidance while we complete introductory research into the Chicago crime dataset and statistical graphic design



Figure 5 Treemap of Crimes in Chicago

- The treemap explains the frequencies of the type of crime that was committed, and indexes into the frequencies of each description regarding crime type
- We see that the highest occurring crime is Theft, and the type of theft that occurs is on goods worth \$500 and under

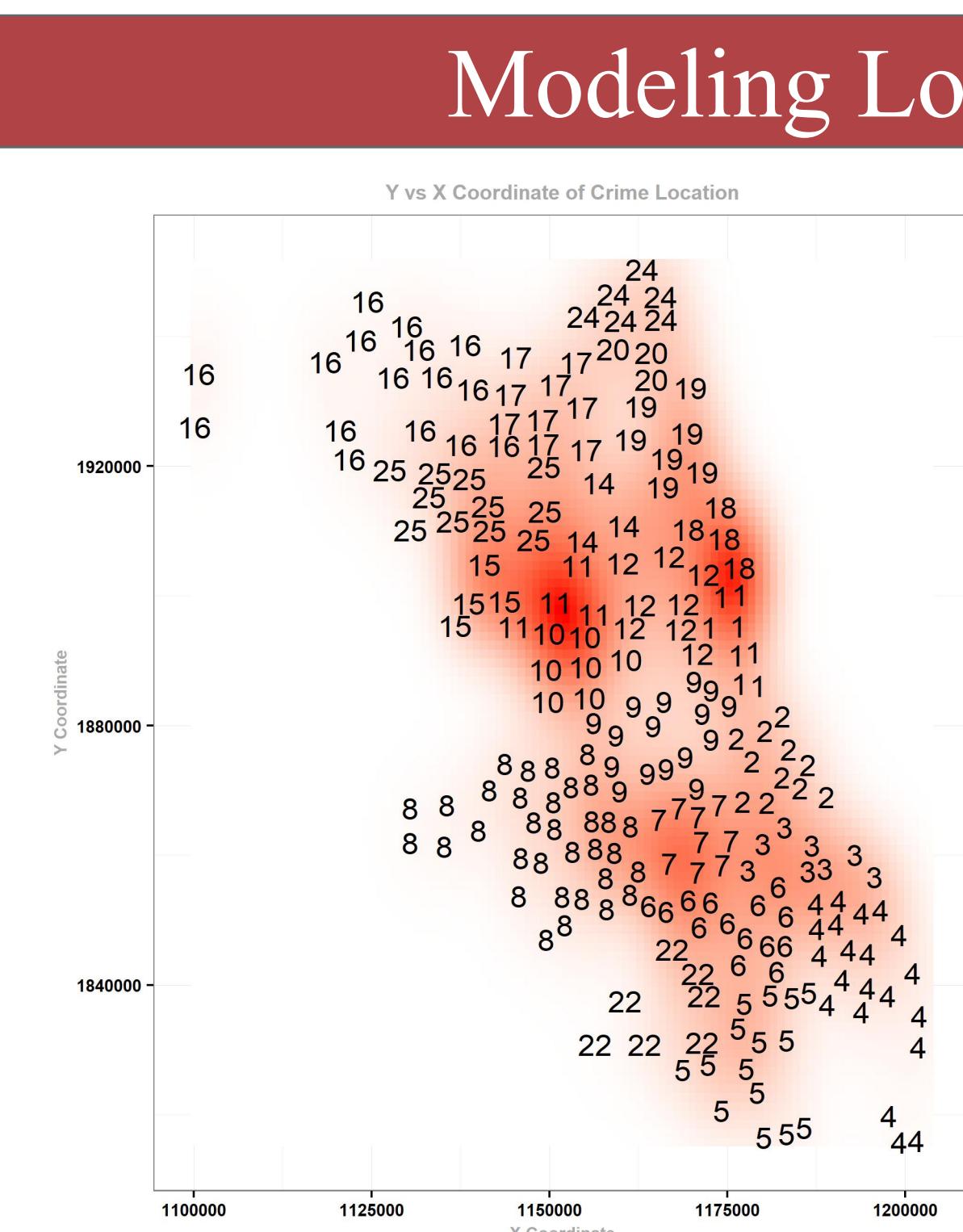


Figure 6: Density of Crime Based on District

- The bulk of crime occurs in the center of the city, with few crimes occurring on the northwest and southeast ends of the city
- Crime is particularly rampant in districts 18 and 11, extending into neighboring districts as well
- In general, the southern portion of the city is relatively safer to live in, with fewer very crime dense areas like 11, 12 and 18 in the northern part of the city

Modeling Locations of Crimes Committed

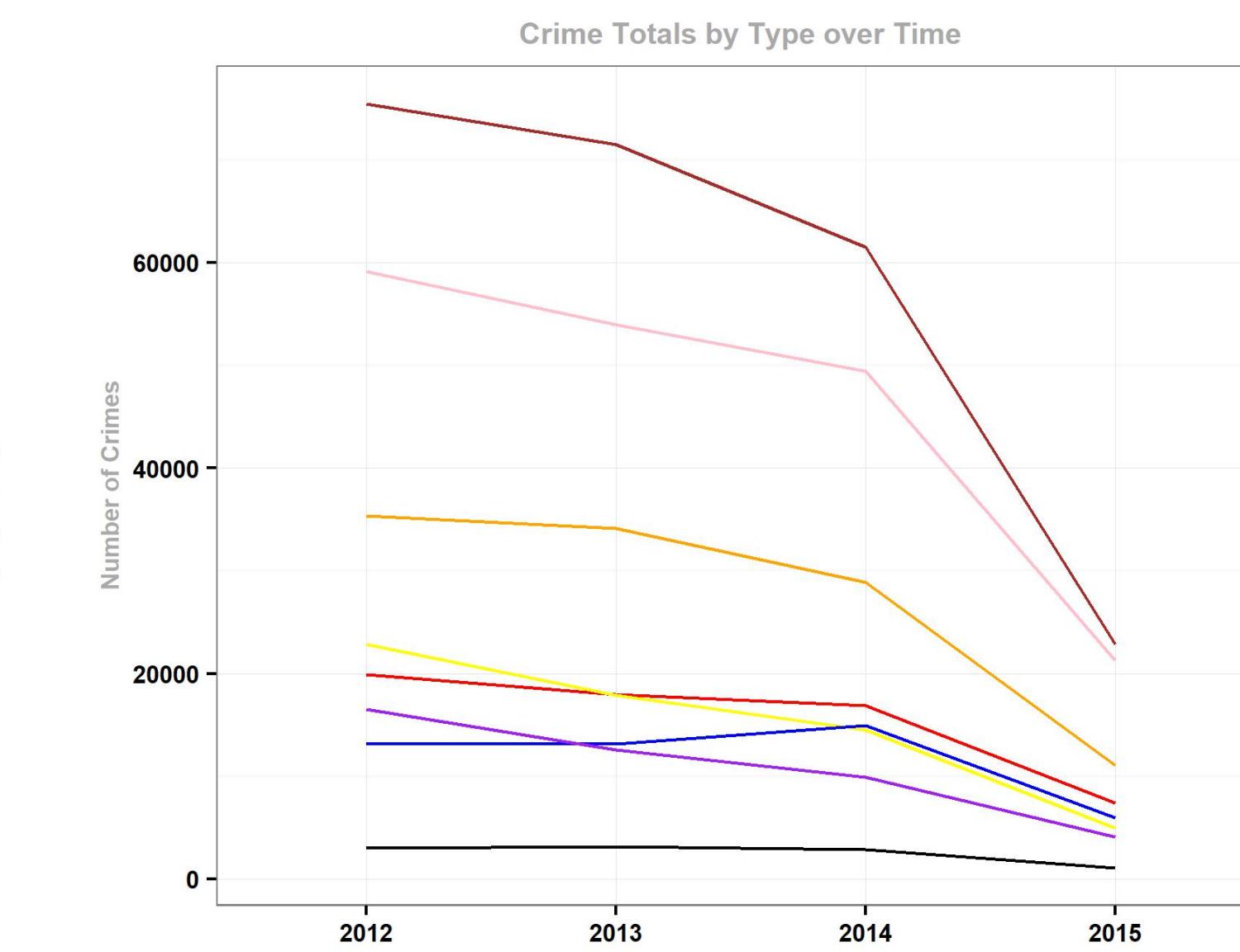


Figure 7: Time Series of Crime over Time

- All categories of crime included in the graph had a net downward trend from 2012 to 2016
- The strongest decrease came from battery and assault which in 2012 totaled at over 60,000 instances for each category, but have declined to approximately 0
- The lowest total decline came from public peace violations which were already low in total at 2012

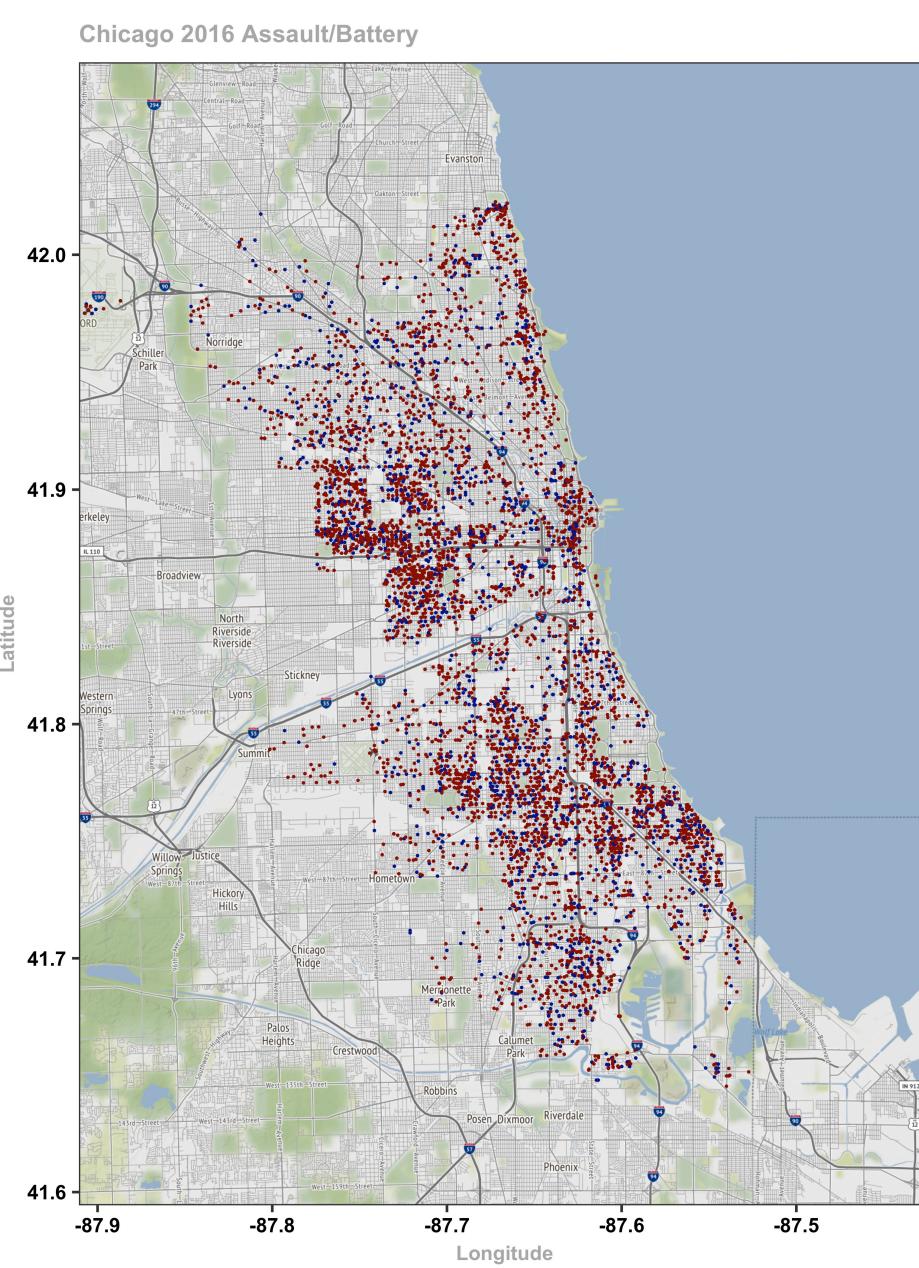


Figure 8: Map of Crime in Chicago based on assault and battery in 2016

- Plotting the crime by map reveals areas where assault and battery, some of the most violent crimes, are concentrated
- There are two main concentrated bands, one in the Southern half that extends towards the lake, and very concentrated region in the Northern half, right above Highway 55

Exploratory Data Analysis

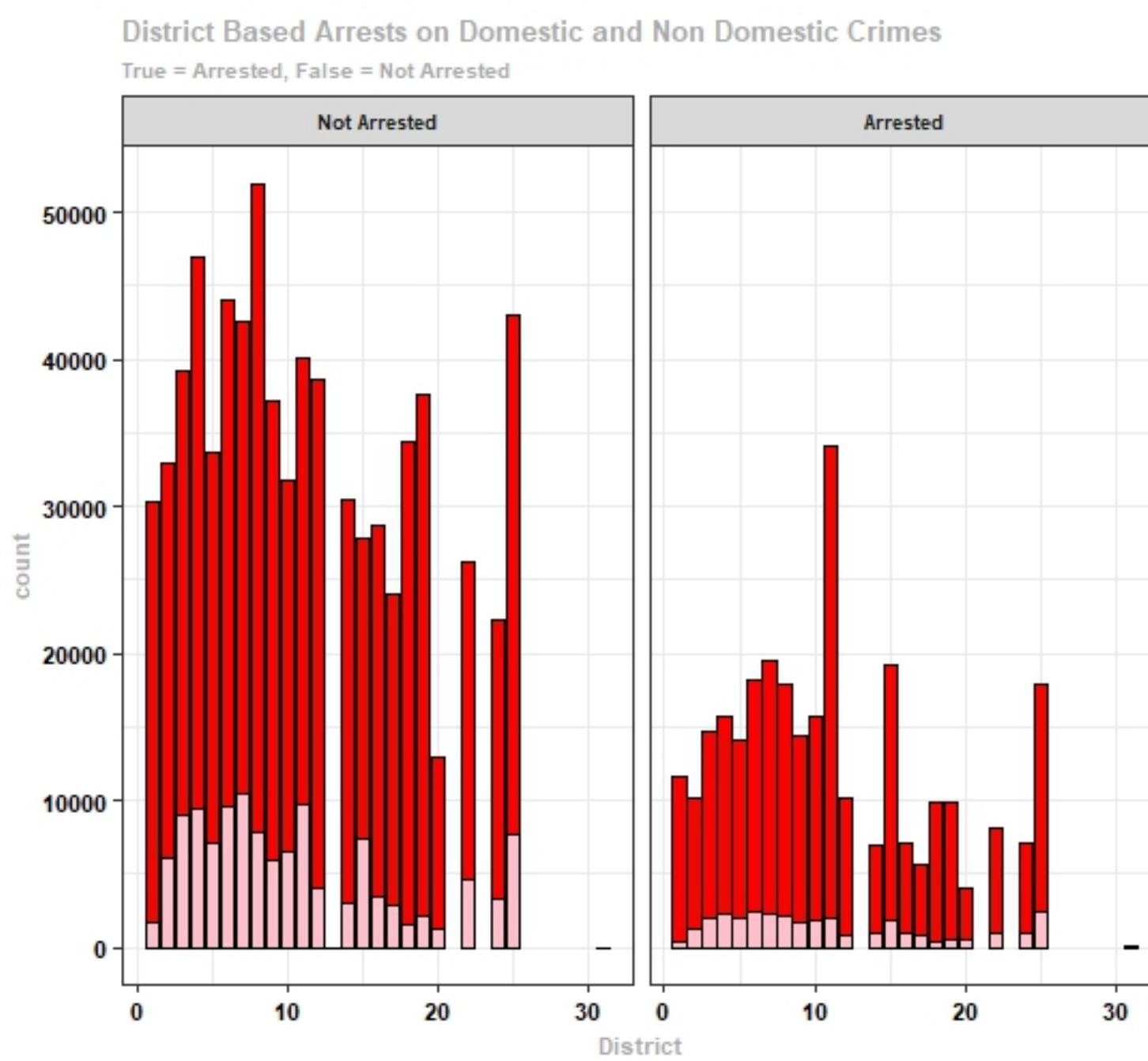


Figure 1: Distribution of arrests based on district

- This tells us how many crimes were committed in each district and whether or not the crimes were domestic
- More people were not arrested than were arrested overall
- Based on this plot, it seems there are less domestic crimes that are arrested compared to not arrested

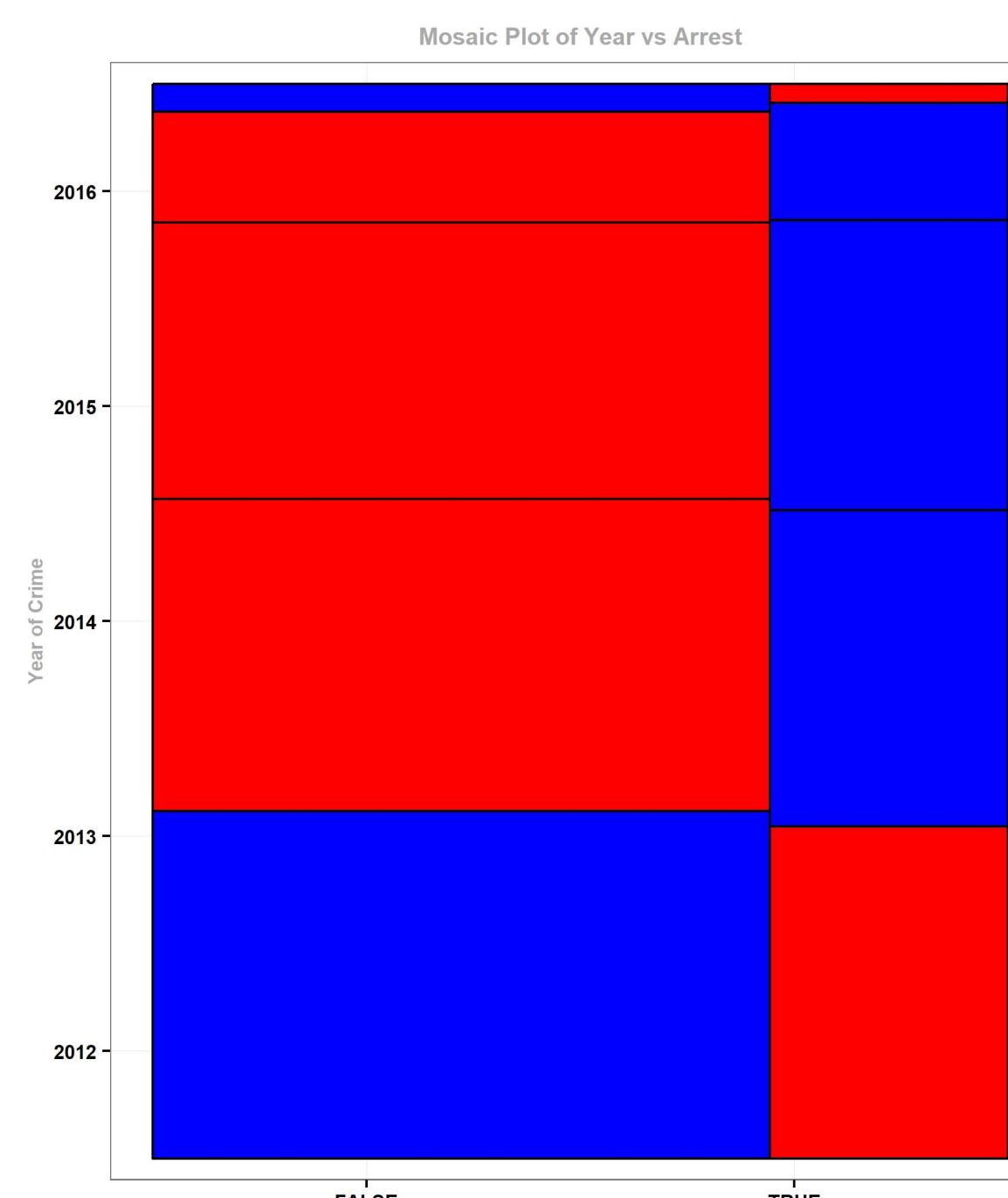


Figure 2: Relationship between Arrest and Year of Crime

- Crime totals have been decreasing, but most crimes have not resulted in an arrest
- Reject the null hypothesis that whether or not an arrest was made after the crime occurred is independent of the year the crime occurred
- Suggests there is a possible relationship between whether an arrest was made and the year the crime occurred in

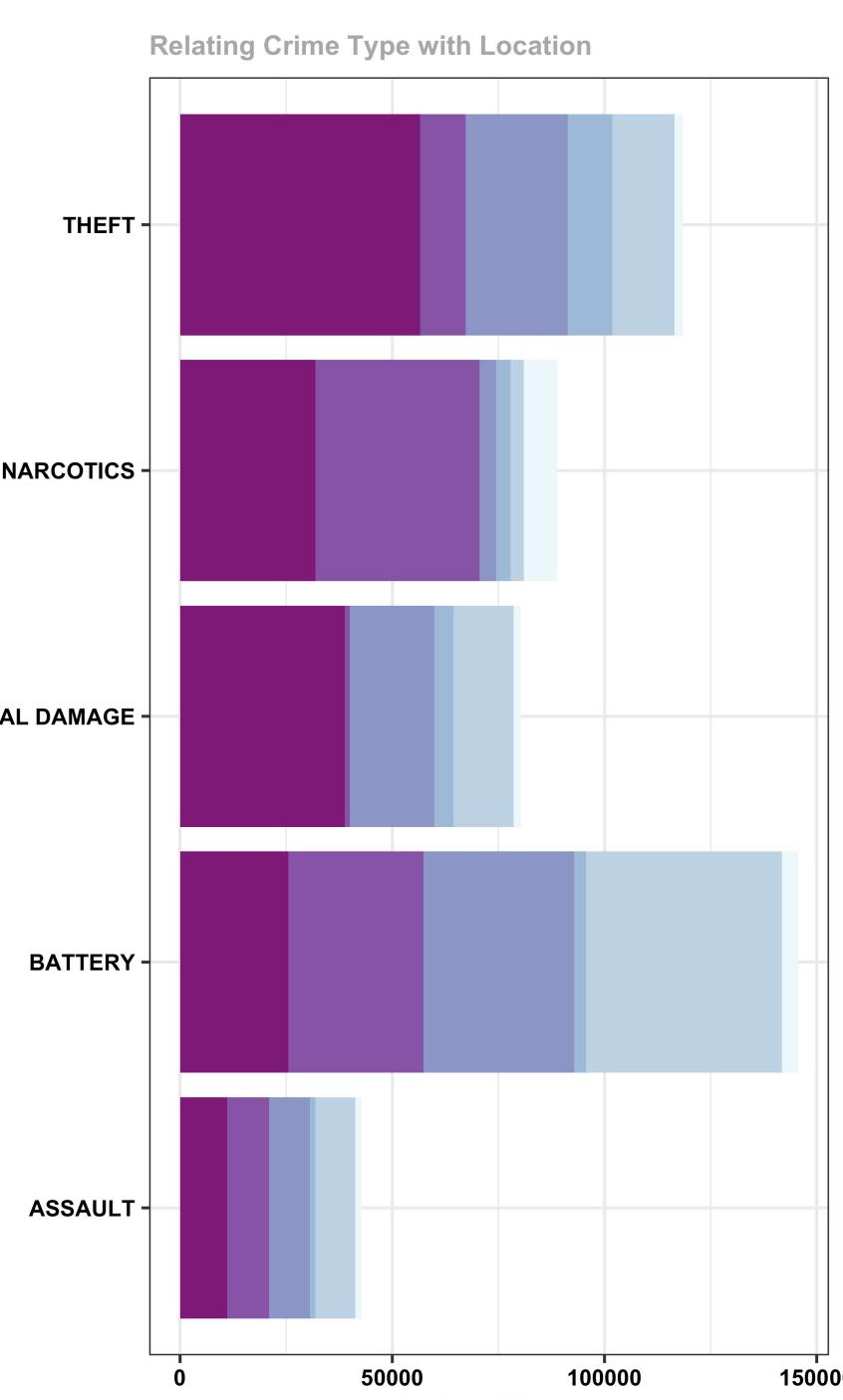


Figure 3: Relating Crime Type with Location

- Plotting crime type by location reveals some insights on where different crimes take place
- Narcotics are more often in alley's than other crimes, and theft is more common on the street than any other crime
- Battery was the most common crime in apartments and other residences while assault seemed the most equally distributed crime amongst locations

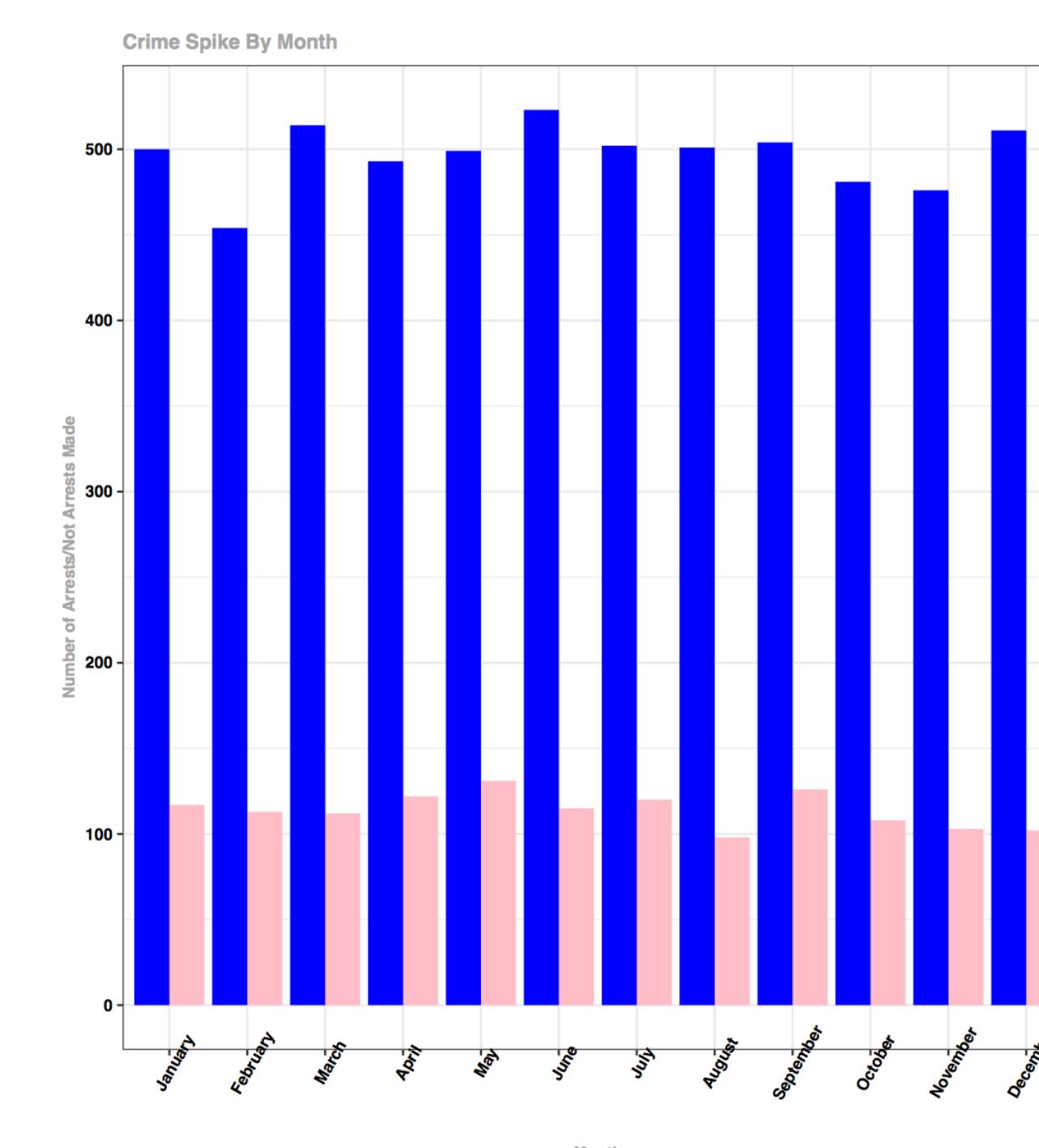


Figure 4: Assaults vs Arrests through 2016

- This bar graph shows the number of assaults that led to arrests over the year 2016
- We see that the most number of arrests happened in May, but also had the 5th most non-arrests. Most crimes occurred in June, but also had the most non-arrests. Overall, most assaults did not lead to arrests through 2016, especially in the summertime.

Research Objectives

- We thought it would be interesting to see whether there was more crime in certain areas compared to others based on districts and beats (the smallest police geographic area)
- We also wanted to see if the number of crimes decreased over time as well

Discussion

- It would be interesting to see these graphs with a larger data range to consider how crime has changed over a longer period of time