

# CRIME TEND ANALYSIS

Team:

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CSCI 5502

# Proposed Work

- Analyzing Crime Pattern over the last 15 years:
  - Effects of various external factors on crime.
    - External factors may include weather, sports events like super bowl, elections, movies and so on.
  - Crime Patterns to establish safe neighborhoods.
  - How crime patterns have evolved over the years in certain neighborhoods.

# Datasets

- **Crime Data:**

US City Open Data Census: <http://us-city.census.okfn.org/dataset/crime-stats>

- **Weather Data:**

Weather Underground: <https://www.wunderground.com>

- **Tools used :**

Python/Pandas library, MS Excel, R,

- **Evaluation Criteria :**

Accuracy, Robustness, Interpretability

# Data Preprocessing

- Identified major crime categories and mapped all the crime types in each of the datasets to one of these categories.
- Removed irrelevant records based on crime types.
- Extracted Date from various Date-Time formats.
- Ignored records with missing address while mining for safe neighborhoods and crime patterns.
- Integrated Weather data with crime datasets to analyze correlations between crime rate and weather factors such as temperature, dew point, humidity, etc.

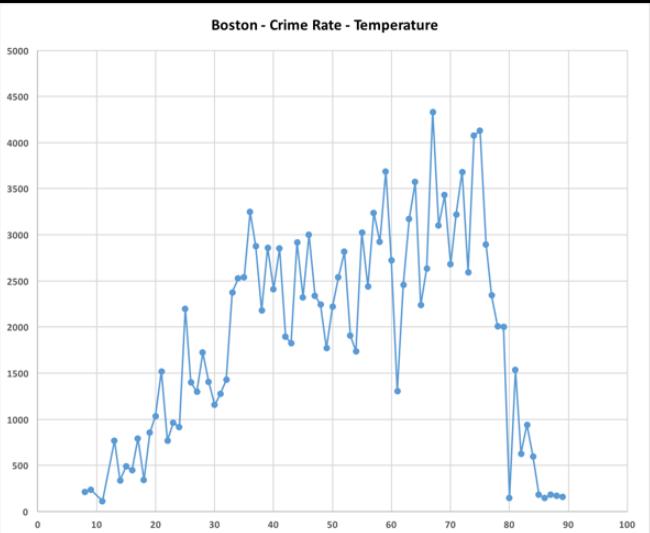
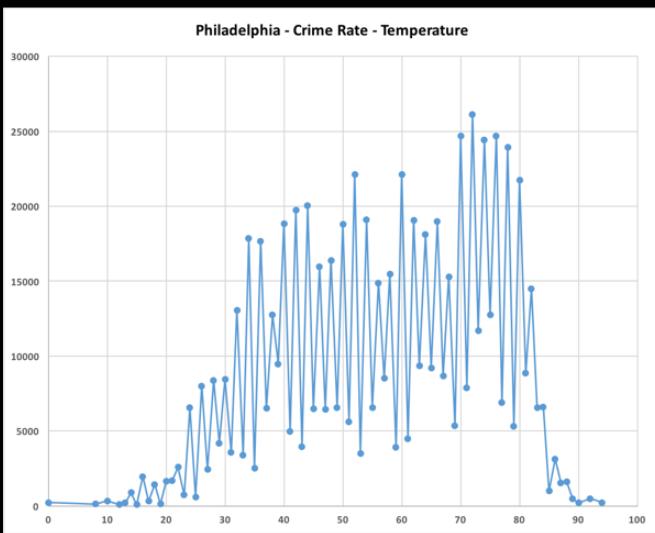
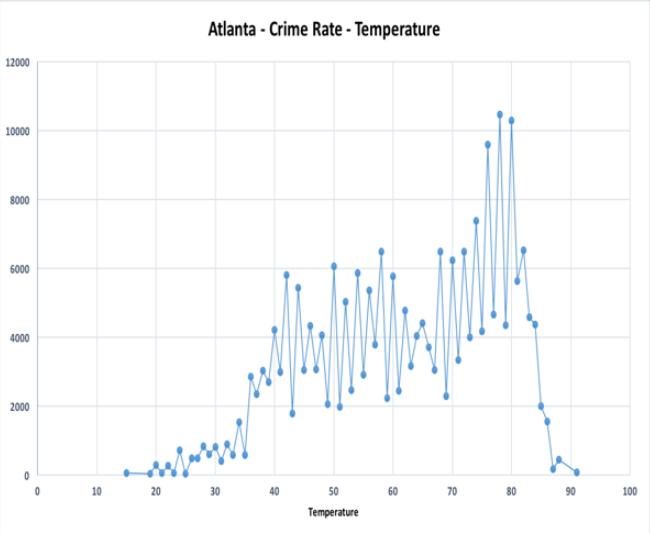
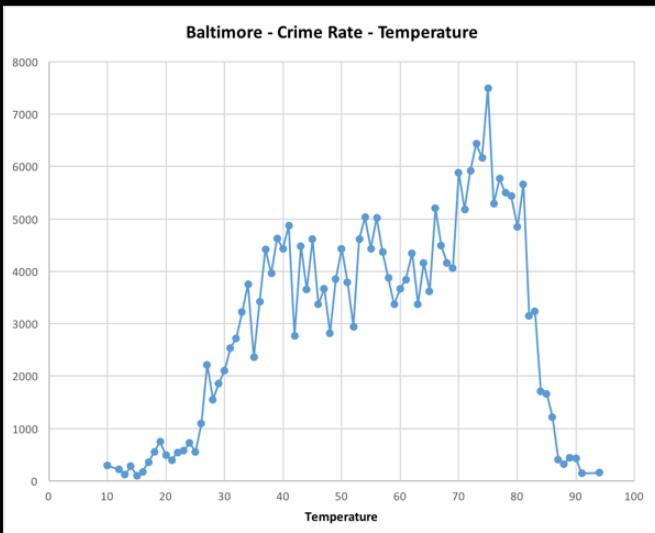
# Tasks Performed

- Checked for any correlations between crime rates in various cities and:
  - Weather
  - Major events like Super bowl, Presidential elections etc.
  - Release of violent movies such as The Departed, Django Unchained etc.
- Predicted the crime patterns for a given weather
- Identified crime rates in various neighborhoods and relatively classified the safety of each neighborhood.
- Analyzed the crime patterns of certain neighborhoods over the years.

# Classification and Prediction

- Correlation Analysis
  - Correlation between weather attributes and crime rates is calculated using correlation coefficient
  - Correlation between temperature and crime rates is an average of 0.5
- Decision Tree
  - Uses parameters like temperature and dew point from the training data to classify the crime types and uses this classification to predict the type of crime that could occur for a given set of parameters with an accuracy of 69 – 92% based on the city.
  - Random Forest classifier was also implemented which gives a slightly more accurate classification than decision tree.
- Naïve Bayes
  - For a given set of parameters, the probability of occurrence of various crime types is generated.

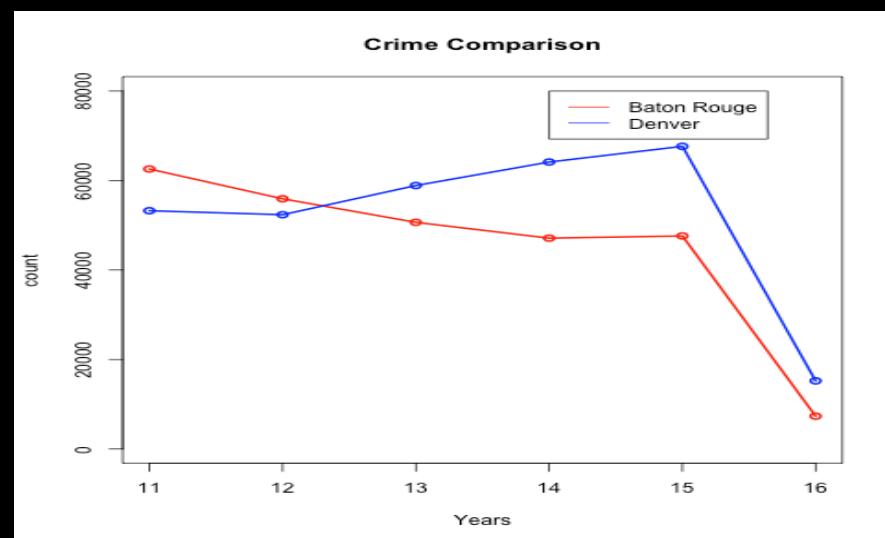
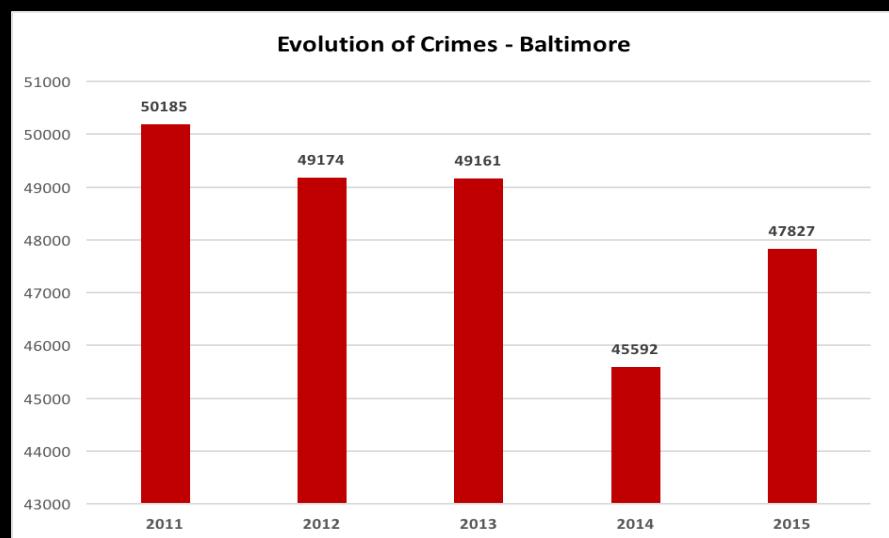
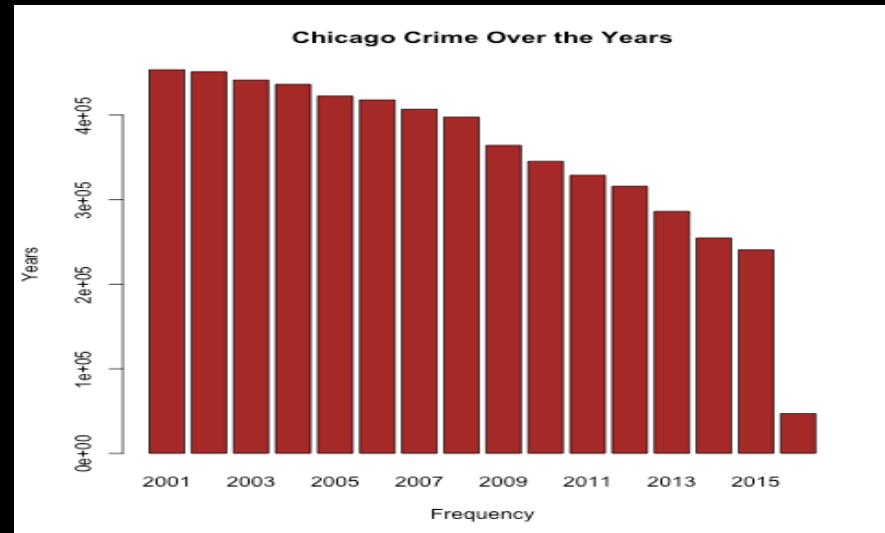
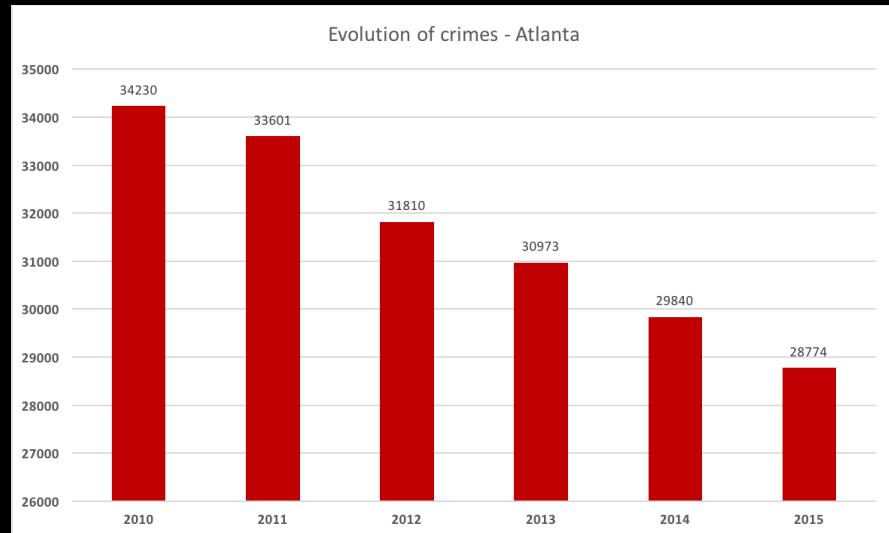
# Variation of Crime with Temperature



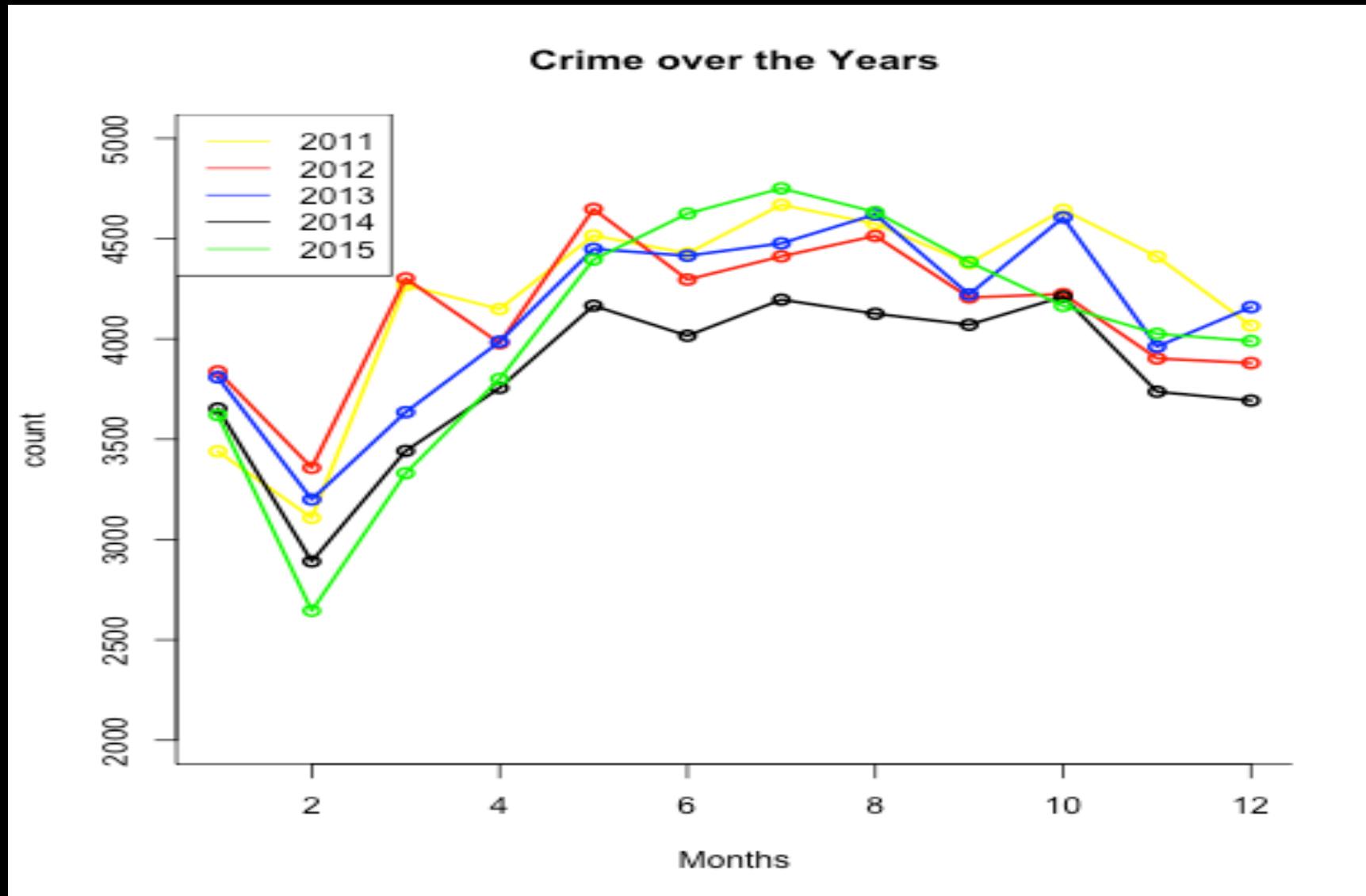
# Baltimore Neighborhoods - Crime Evolution



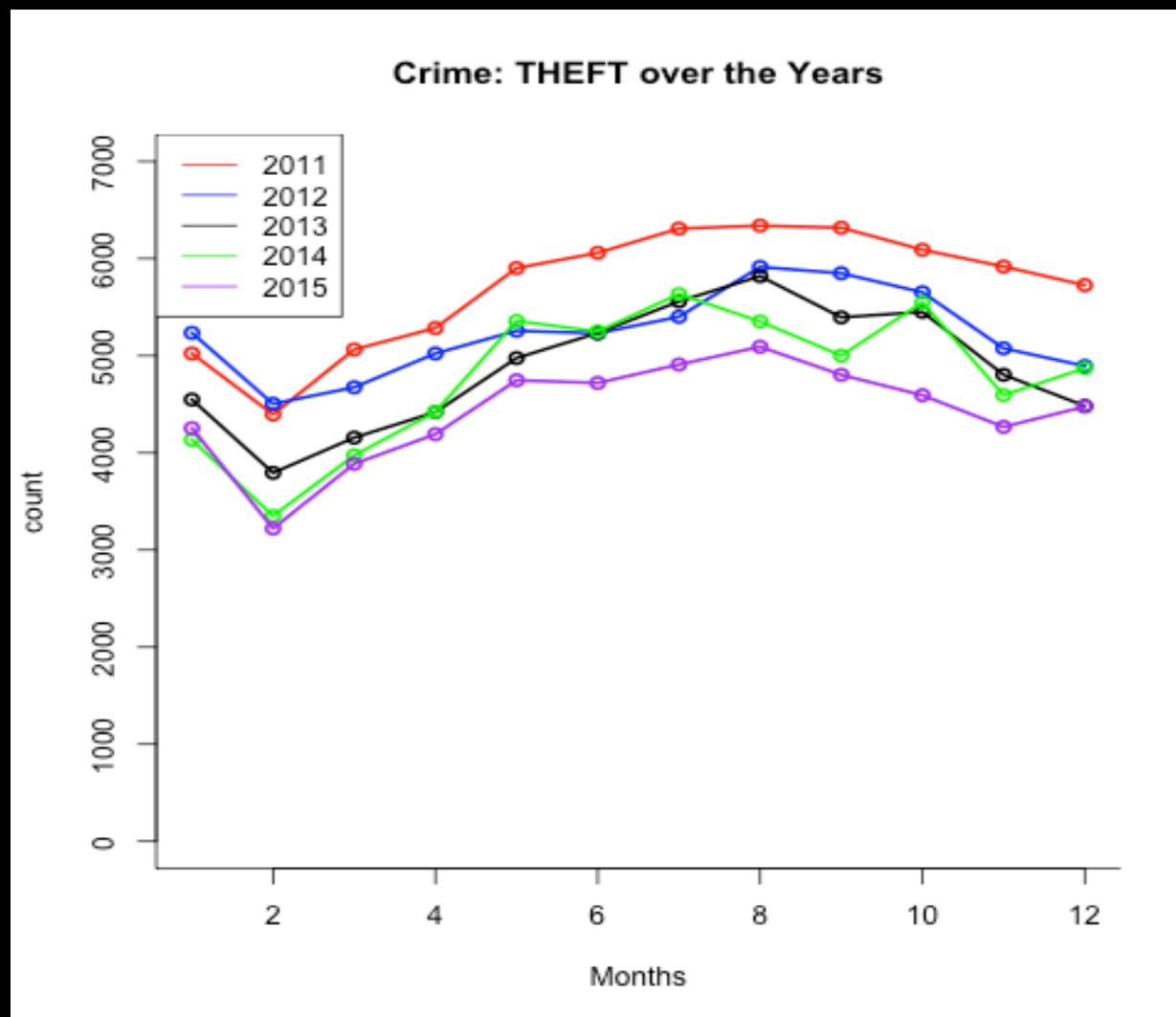
# Crime Rate Changes Over The Years



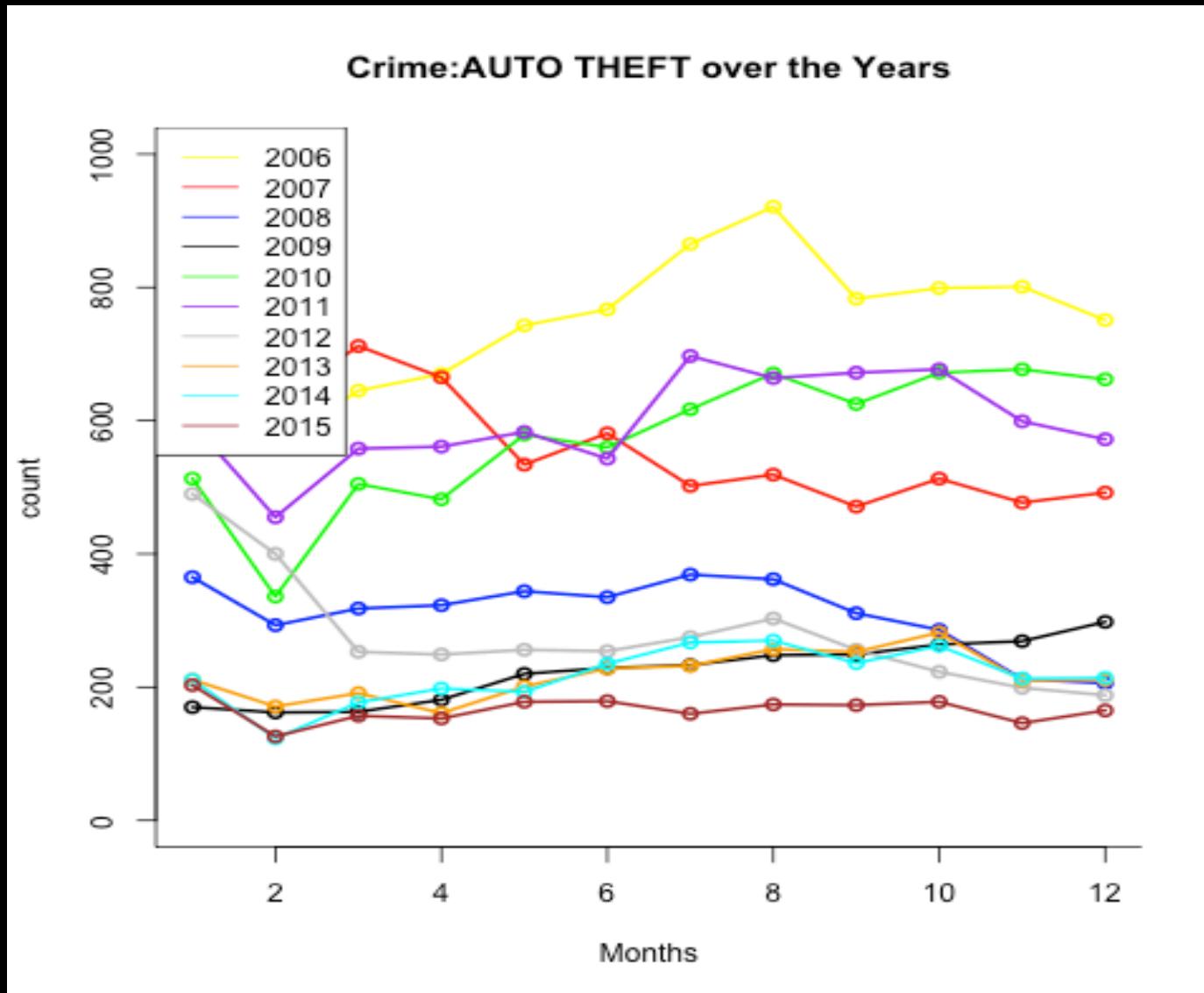
# Baltimore – Crime Rate Change



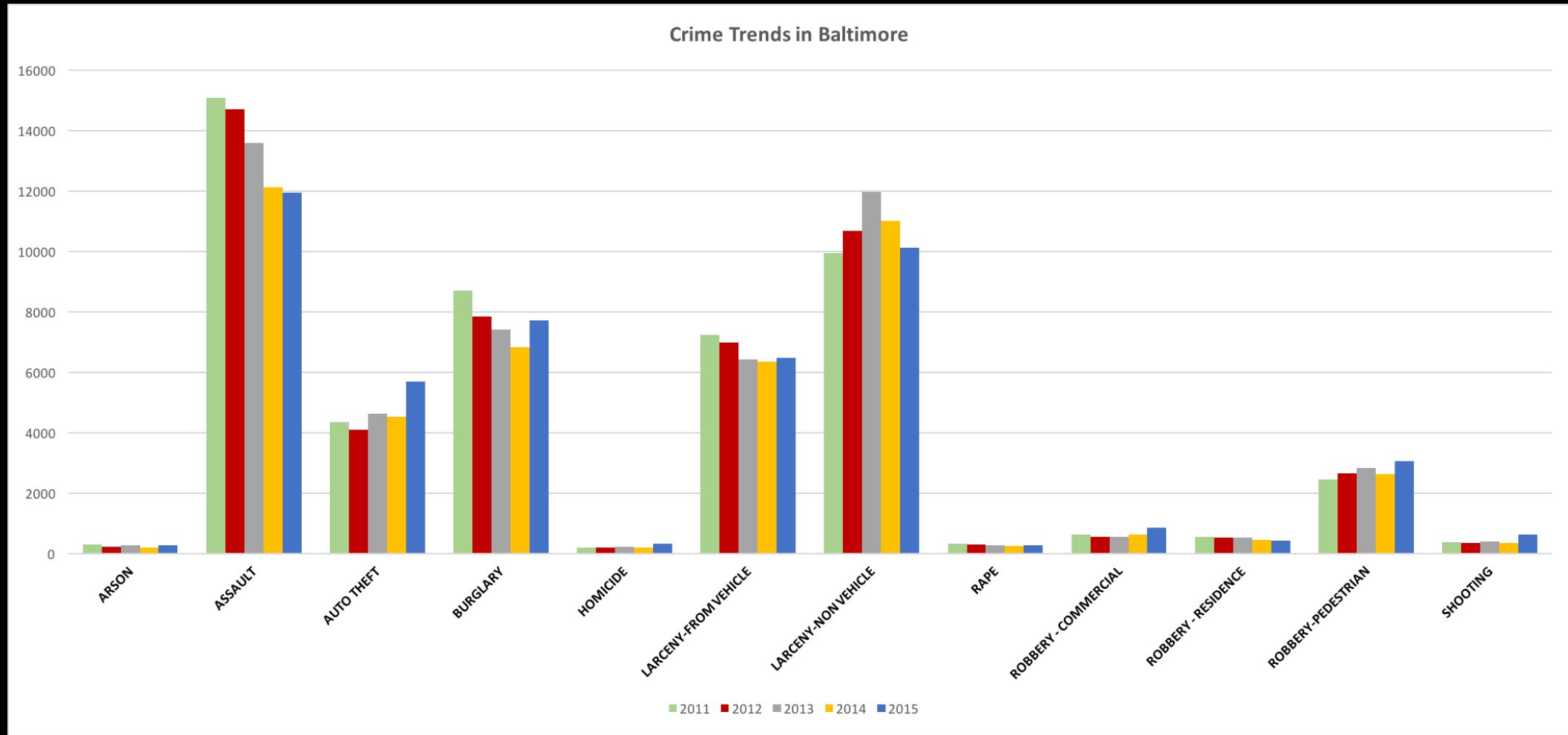
# Philadelphia – Thefts Over the Years



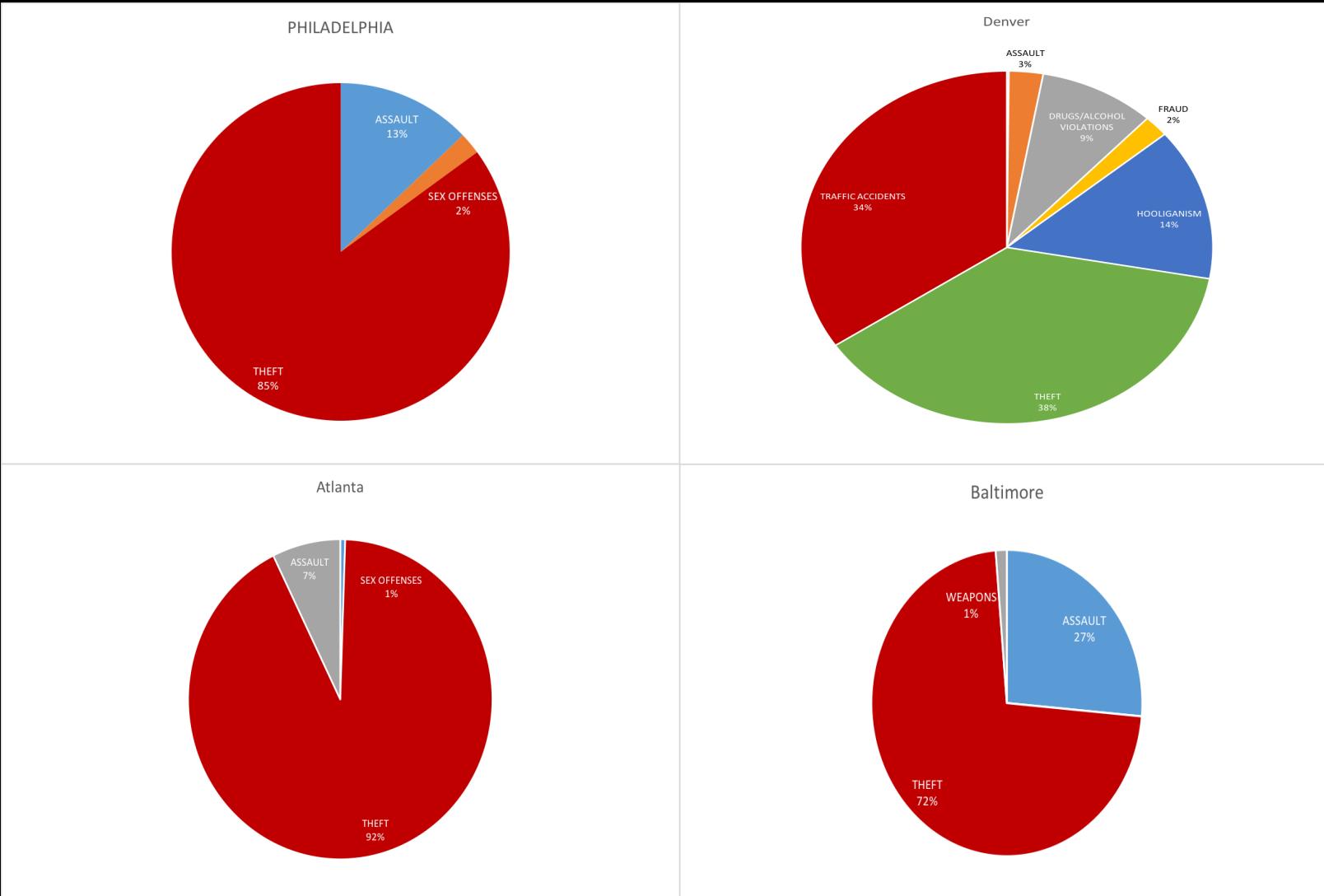
# Philadelphia – Auto Thefts Over the Years



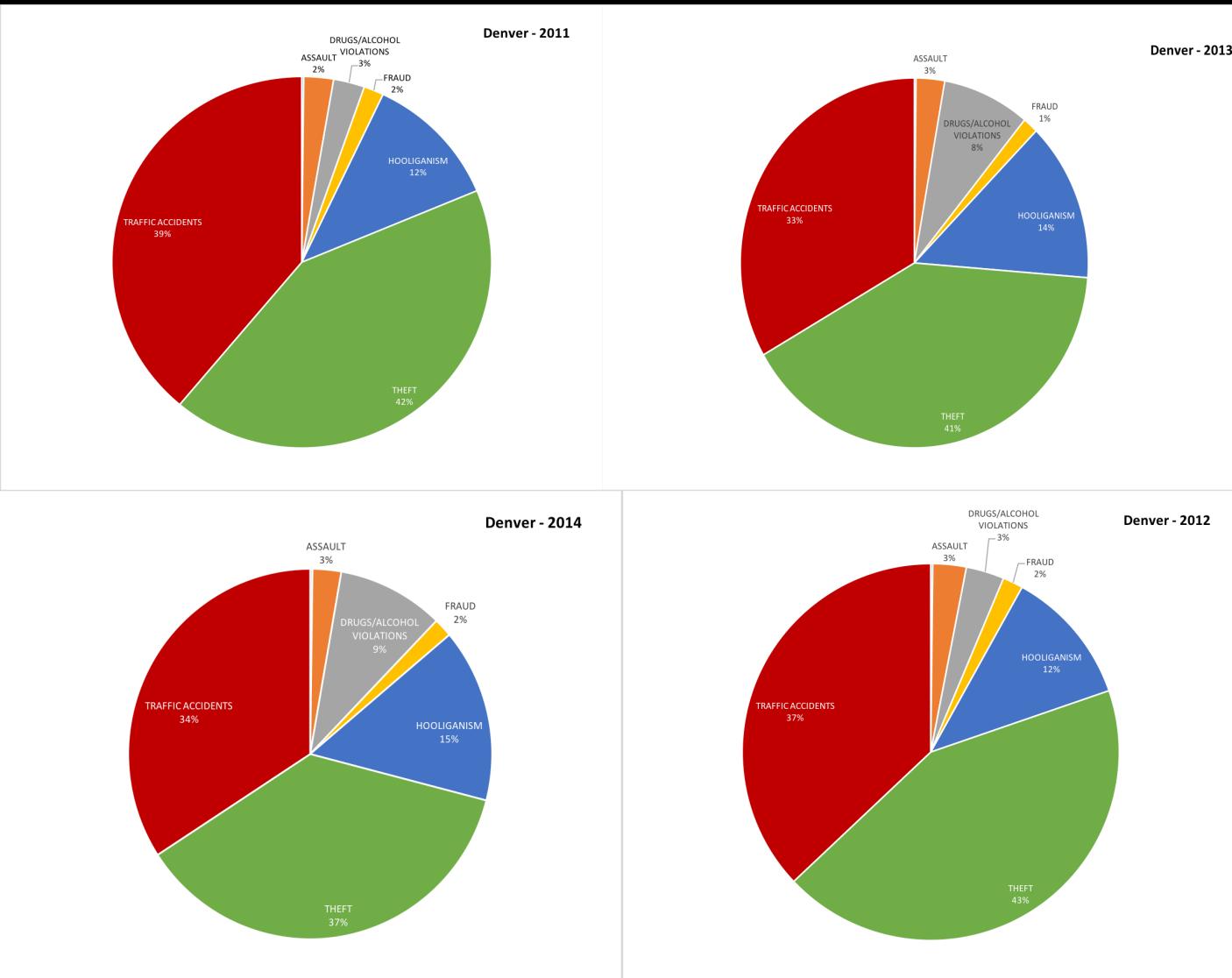
# Baltimore – Crime rates Over the Years



# 2015 Crime Rates in Philadelphia, Denver, Atlanta and Baltimore



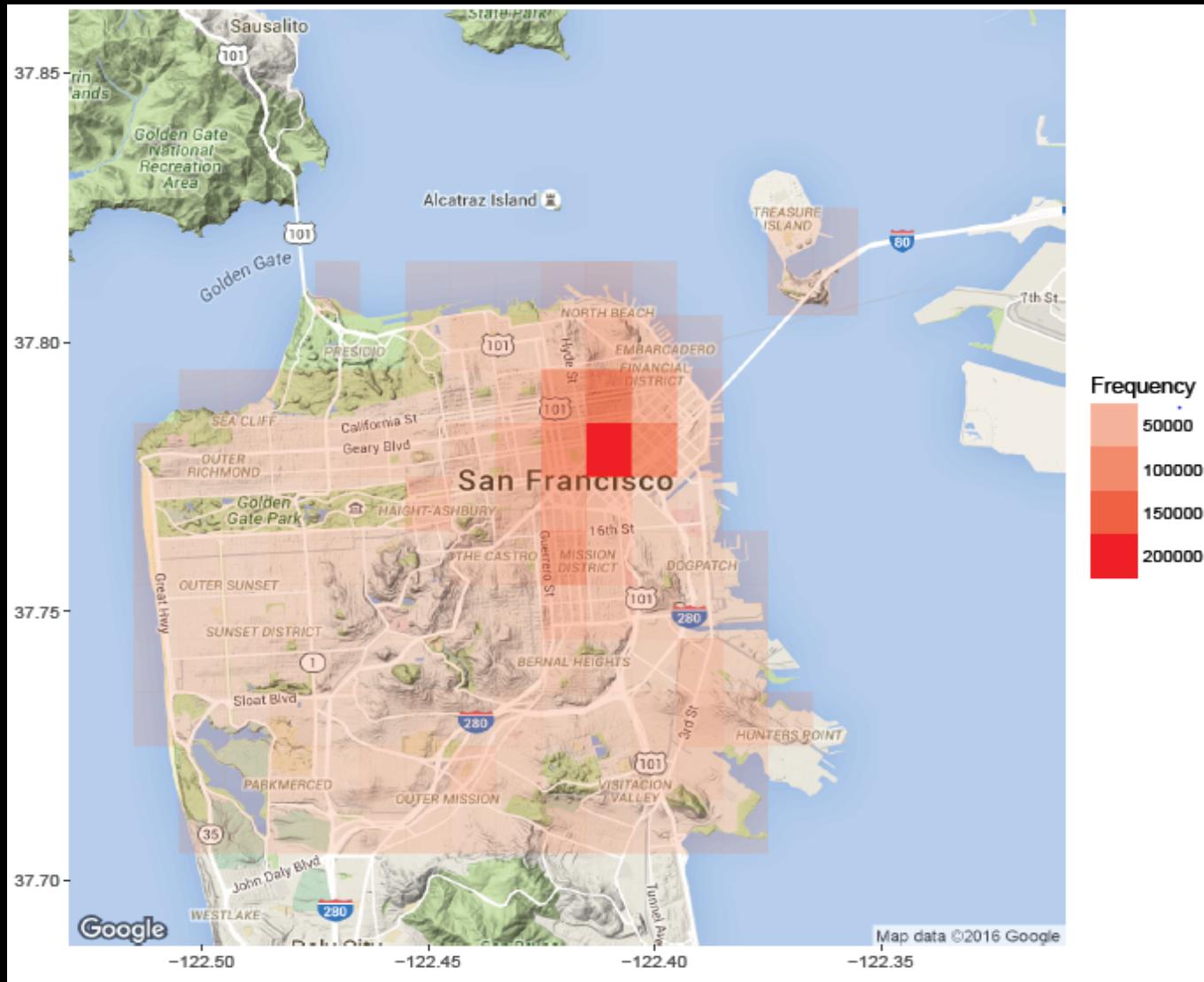
# Denver Crime Rates 2011 - 2014



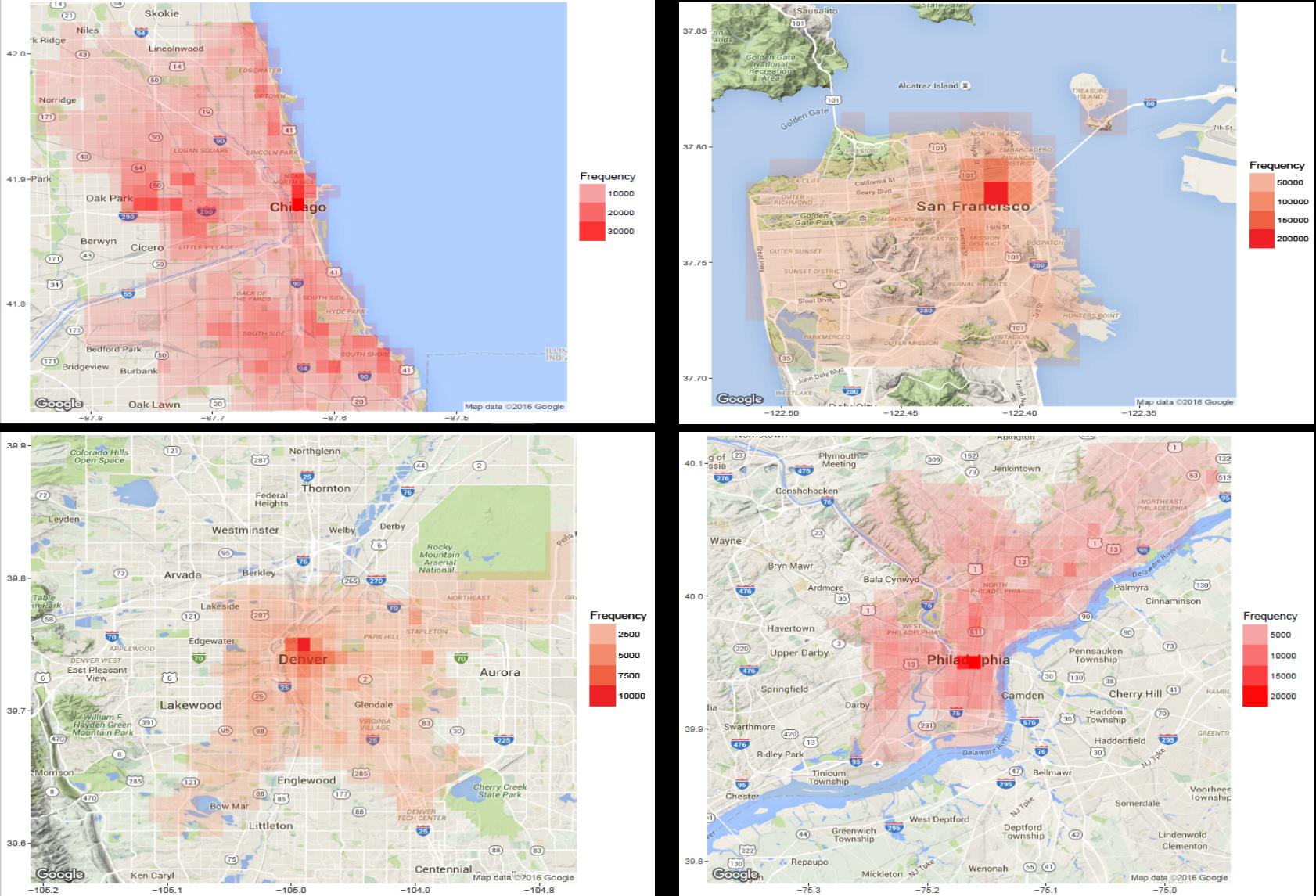
# San Francisco – Crime Numbers Per Area

Latitudes ->	39.20041 -	39.217662 -	39.234914 -	39.252166 -	39.269418 -	39.28667 -	39.303922 -	39.321174 -	39.338426 -	39.355678 -
Longitudes	39.217662	39.234914	39.252166	39.269418	39.28667	39.303922	39.321174	39.338426	39.355678	39.37293
-76.52894 --										
76.54719	0	6503	7927	123	0	0	0	0	2737	857
-76.54719 --										
76.56544	6583	28675	44758	7955	13323	3747	21314	12659	0	0
-76.56544 --										
76.58369	14232	20470	18188	21276	37696	89518	173907	97878	24386	0
-76.58369 --										
76.60194	19528	7841	20974	45735	84731	91110	243857	70099	41681	0
-76.60194 --										
76.62019	12649	28985	12050	12760	32780	46818	61064	26132	18912	0
-76.62019 --										
76.63844	19113	15444	5581	6485	8290	43847	22250	7714	7214	0
-76.63844 --										
76.65669	16857	11675	5230	5109	9565	14861	21500	719	0	0
-76.65669 --										
76.67494	7651	12868	6640	11897	11949	5935	14137	61	205	0
-76.67494 --										
76.69319	1544	704	7099	6696	7791	4313	9796	216	0	0
-76.69319 --										
76.71144	273	301	3598	3975	8749	5596	3974	0	0	0

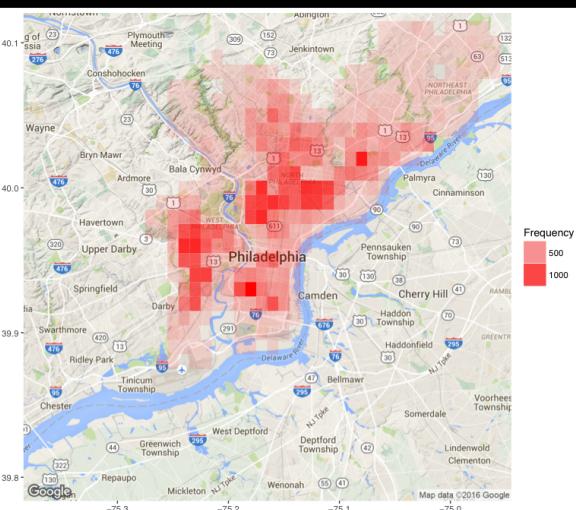
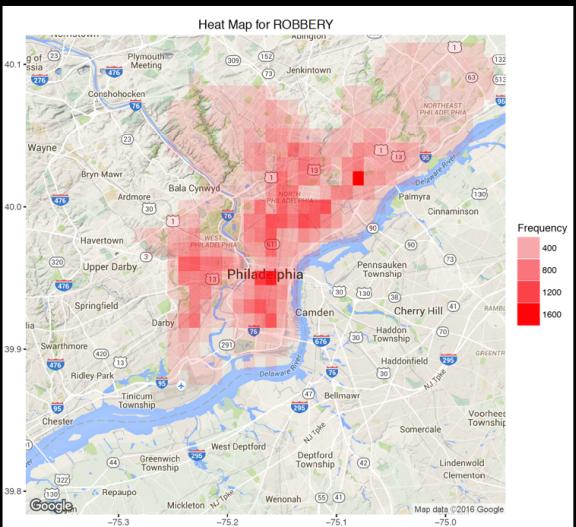
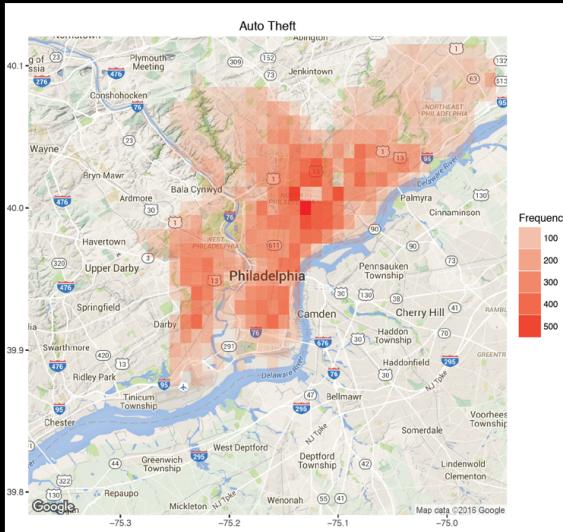
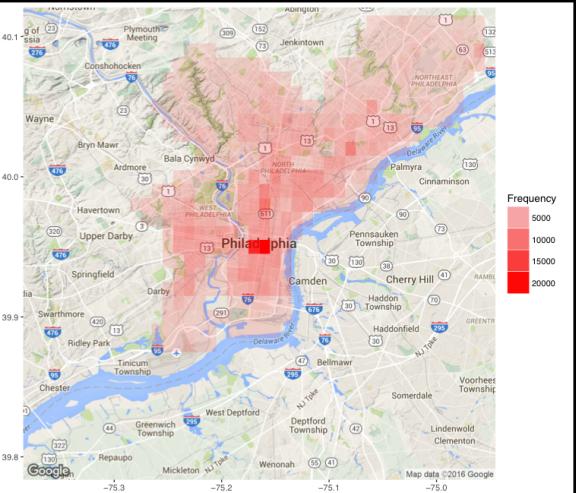
# San Francisco – Crime Numbers Per Area



# Crime Distributions – Various Cities



# Philadelphia – Distribution of Overall Crime, Auto-Theft, Robbery, Assault



Thank You