

# **MINNESOTA CRIME RATE VISUALIZATION**

## **CPSC 8040: DATA VISUALIZATION FINAL PROJECT REPORT**

**SUBMITTED BY  
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## INTRODUCTION

Data visualizations are a great way to analyze and gather information easily as the visual aspects tend to represent more information than text. Why visualize data? Visualization transforms data into images that effectively and accurately represent information about the data. It is a good way to communicate complex information, because we are highly visual animals, evolved to spot patterns and make visual comparisons.

In this project, the primary goal is to create an interactive visualization between the volume and effects of crime in the city of Minnesota through the year 2010 to 2016. The data-set includes attributes like time, date and location of crime, nearest neighborhoods, longitude and latitude of the crime. The goal is to address several questions about the crimes that occur in the city of Minnesota through interactive visualizations, find the relationship between multiple attributes that constitute the crime-rate dataset. We posed a few questions that we are interested in finding about the city of Minnesota from the crime-rate dataset.

## DATA SET

The data set did not require any cleaning or removal of outlier data as it was possible to interpret and understand the data easily. The visualizations are being created using Tableau. Since the data is clean, any additional data attributes added to the data set at a later stage might have to be cleaned.

## DATA ATTRIBUTES

The meta-data included in the dataset are:

**ADDRESS** - Represents the address of the crime scene

**PRECINCT** - Town or an area defined for police purposes

**REPORTED DATE**- Date of crime

**TIME OF OFFENSE**- The time at which the offence occurred. Which Includes Est Offense and Reported time, date, month and year

**OFFENSE** - The different types of offense included in the dataset are:

- Burglary
- Robbery
- Theft from motor vehicles
- Other theft
- Motor vehicle theft
- Adulteration
- Shoplifting
- Burglary of Business
- **OFFENSE GROUP** – All these offences are grouped into the Non-vehicle and vehicle related offense into the offense group attribute

**DESCRIPTION OF THE OFFENSE-** Provides the details as description of the occurred offense in words

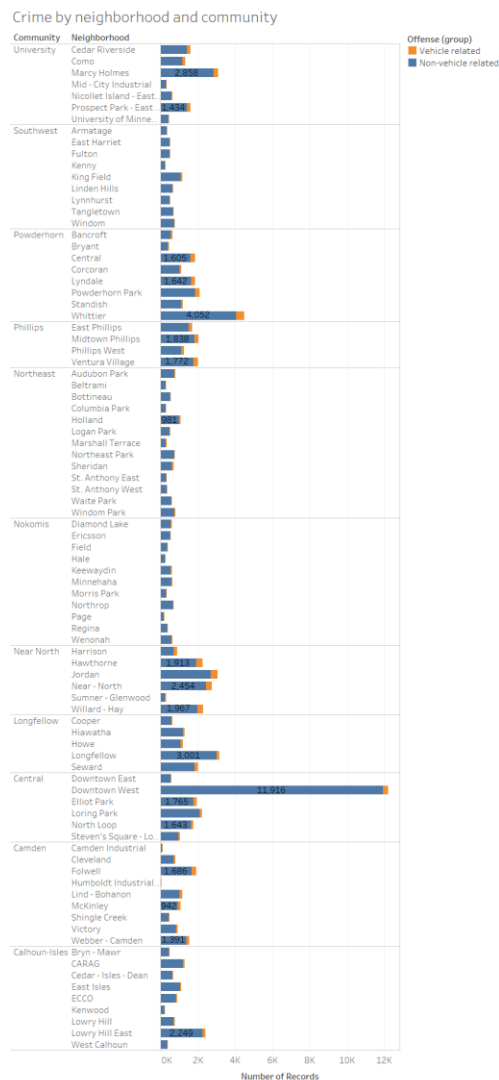
**LATITUDE AND LONGITUDE** of the offense location

**NEIGHBORHOOD** – The place where offence has happened

**COMMUNITY** – All the neighborhood are grouped and placed under a community

## VISUALIZATIONS

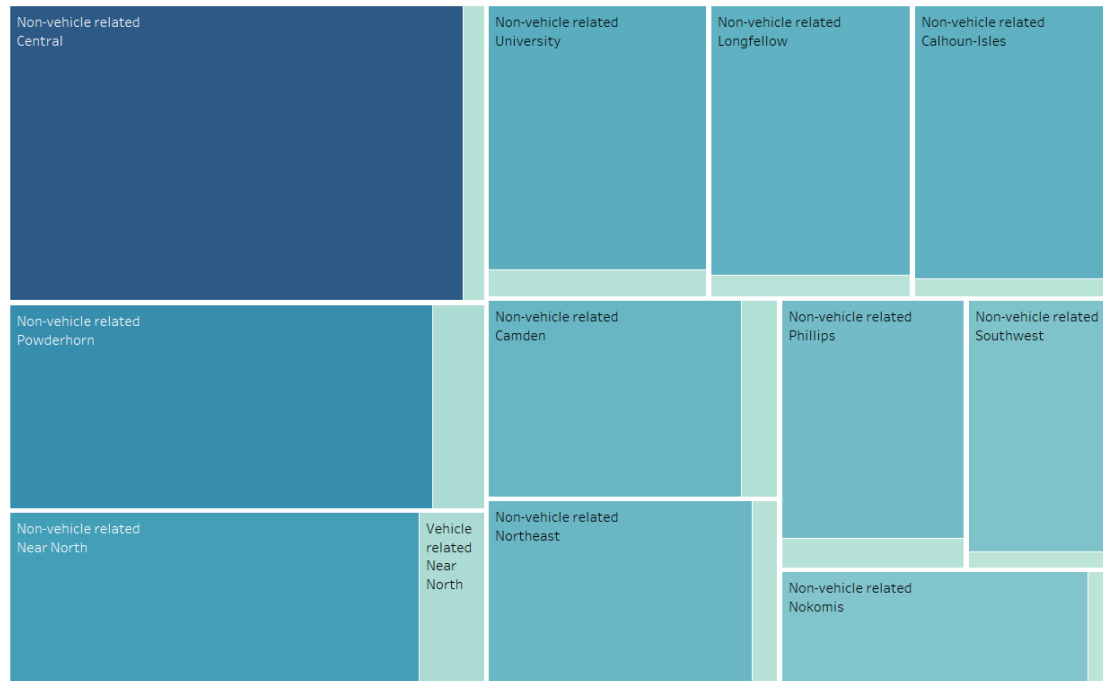
By starting with finding the crime related to vehicle related and non-vehicle related for a neighborhood under a community, we figured out that Down Town West has highest crime rate followed by Whittier, with Downtown west having 11916 crimes related to non-vehicle related and 297 vehicle related crimes. This gives an overview of the communities with highest vehicle and non-vehicle related crimes.



Sum of Number of Records for each Neighborhood broken down by Community. Color shows details about Offense (group). The marks are labeled by sum of Number of Records.

**Central** community has highest non-vehicle related crimes and **Near North** has highest vehicle related crimes.

Offense group for community

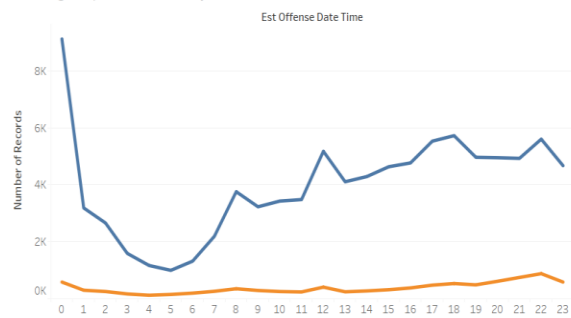


Offense (group) and Community. Color shows sum of Number of Records. Size shows sum of Number of Records. The marks are labeled by Offense (group) and Community. Details are shown for Offense (group). The view is filtered on Offense (group), which keeps Non-vehicle related and Vehicle related.

Number of Records  
337 18,928

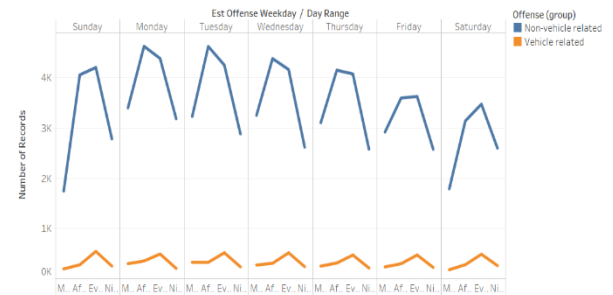
We further found the non-vehicle and vehicle related offense based on daily and hourly basis

Crime group trends hourly



The trend of sum of Number of Records for Est Offense Date Time Hour. Color shows details about Offense (group). The data is filtered on Action (Community, Offense (group)), which keeps 22 members.

Crime group trends daily



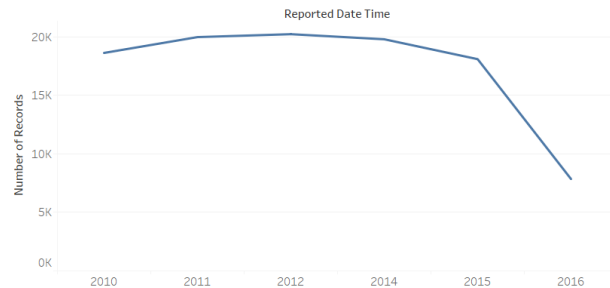
The trend of sum of Number of Records for Day Range broken down by Est Offense Weekday. Color shows details about Offense (group). The data is filtered on Action (Community, Offense (group)), which keeps 22 members.

From the visualization, we can deduce that Non-Vehicle, Vehicle related crimes are highest on **Monday Afternoon** and **Tuesday Evening**.

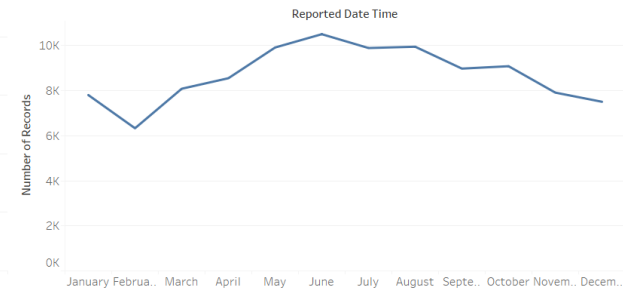
**00:00** hours has the highest rate for Non-vehicle, **22:00** hours has the highest rate for Vehicle related offenses.

To find the total crime trends, we plotted them against the number of records

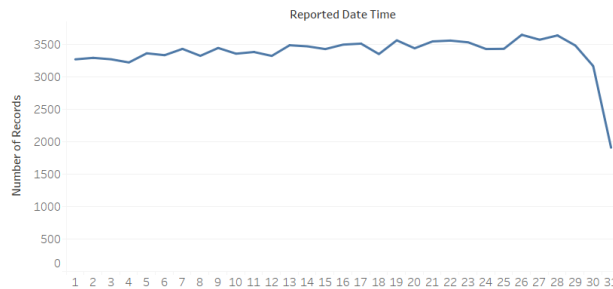
Total crimes trends for year



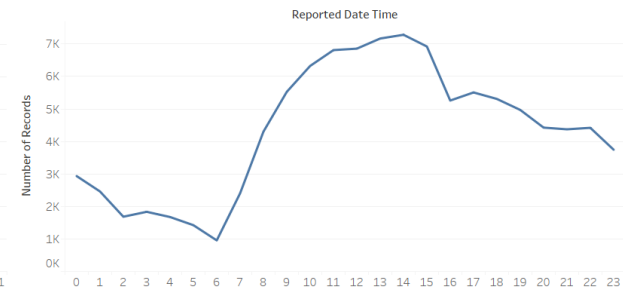
Total crimes on monthly basis



Total crimes per daily basis

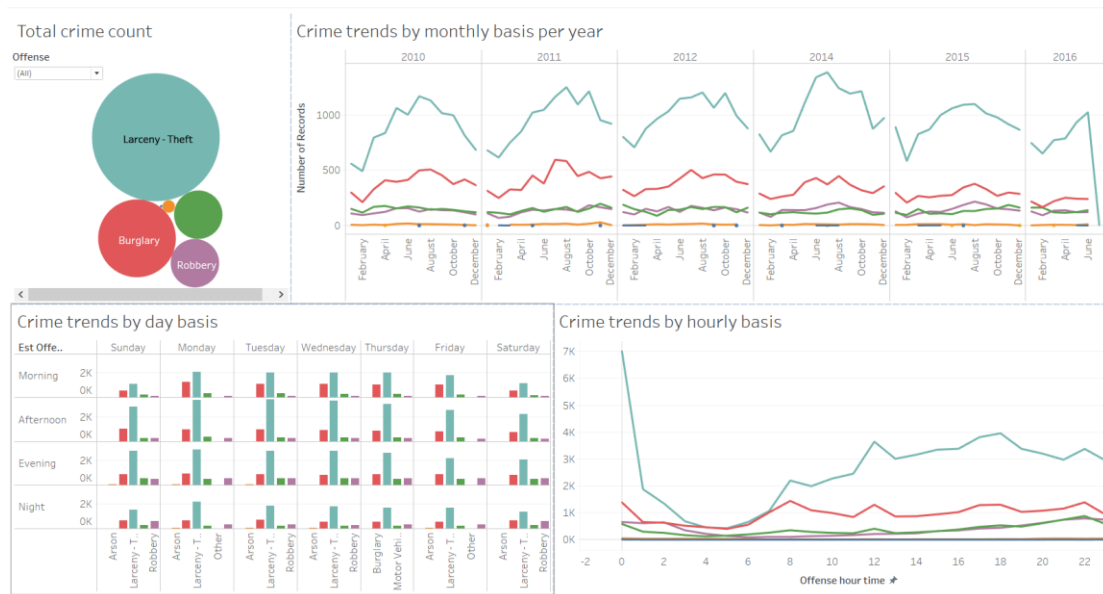


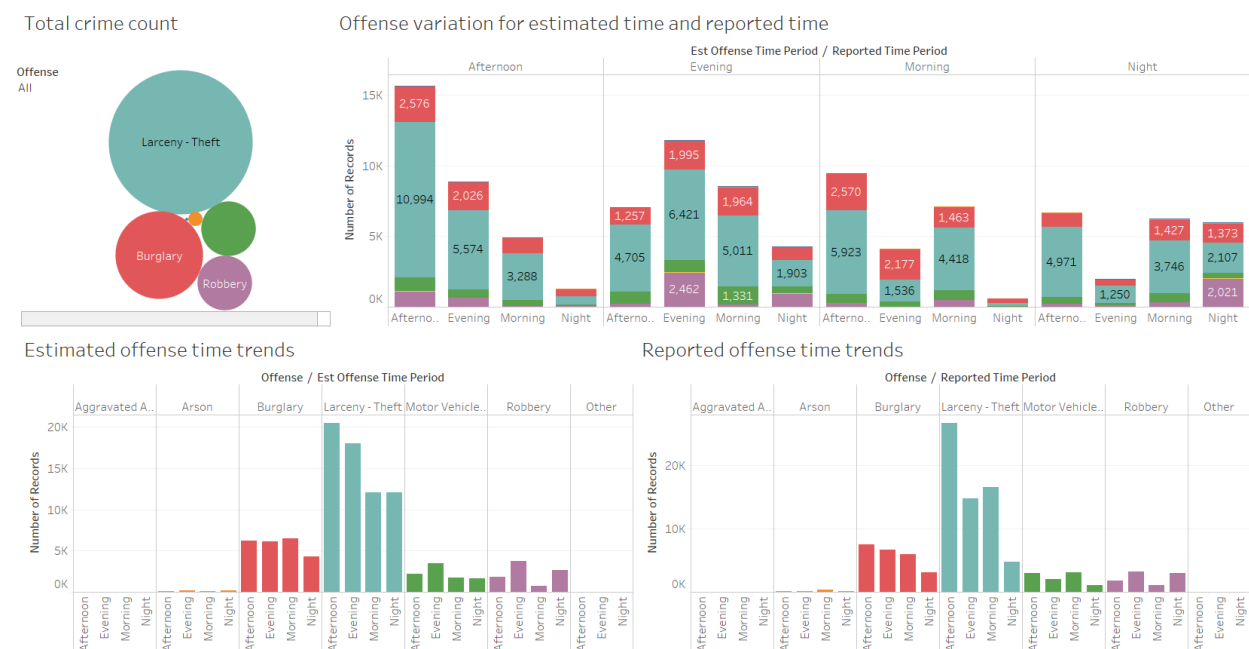
Total crimes trends per hour



To conclude, the highest number of crime reported is: the year - 2012, month – June, day – 26 , hour – 14:00 hours.

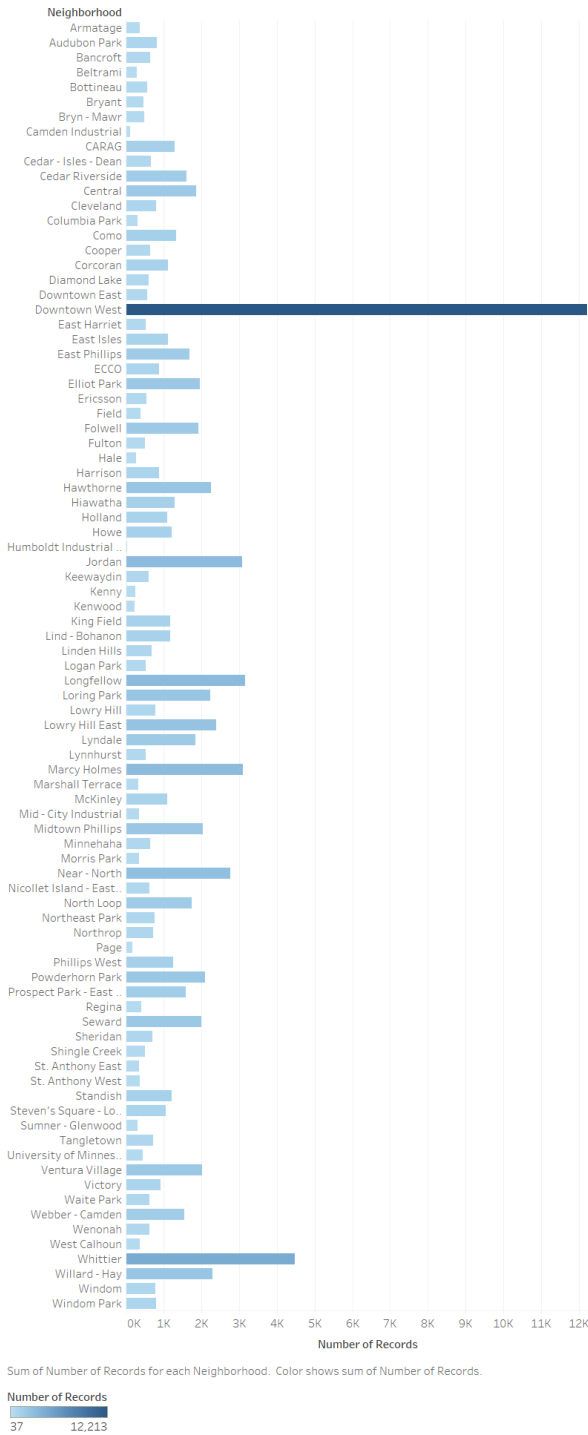
Finding the total number of crime helped to find individual offense report as we made a dashboard to find the correlation among the individual offense



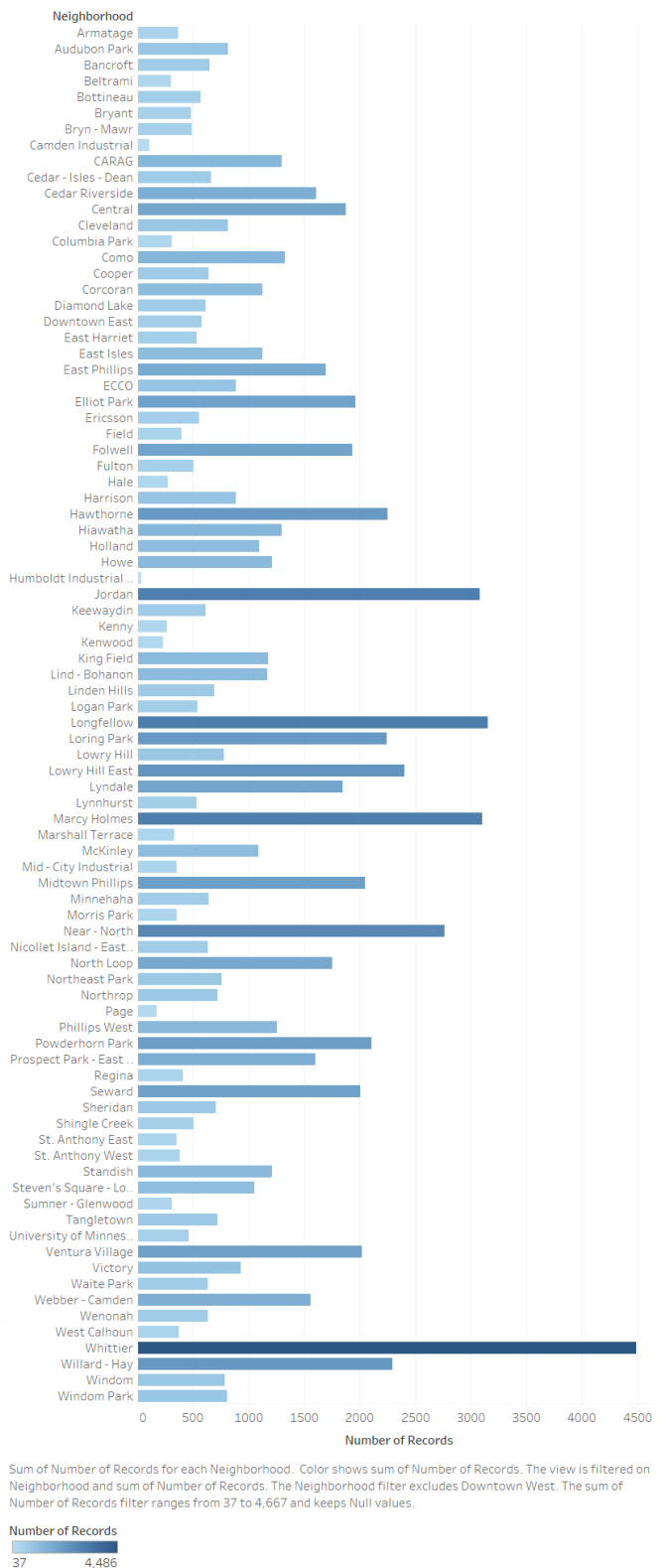


As the Offense trends are obtained, we visualized offense trends effects on neighborhood to find the safe and unsafe neighborhoods and the most happening offense for a period in a day.

safe and unsafe neighbourhoods

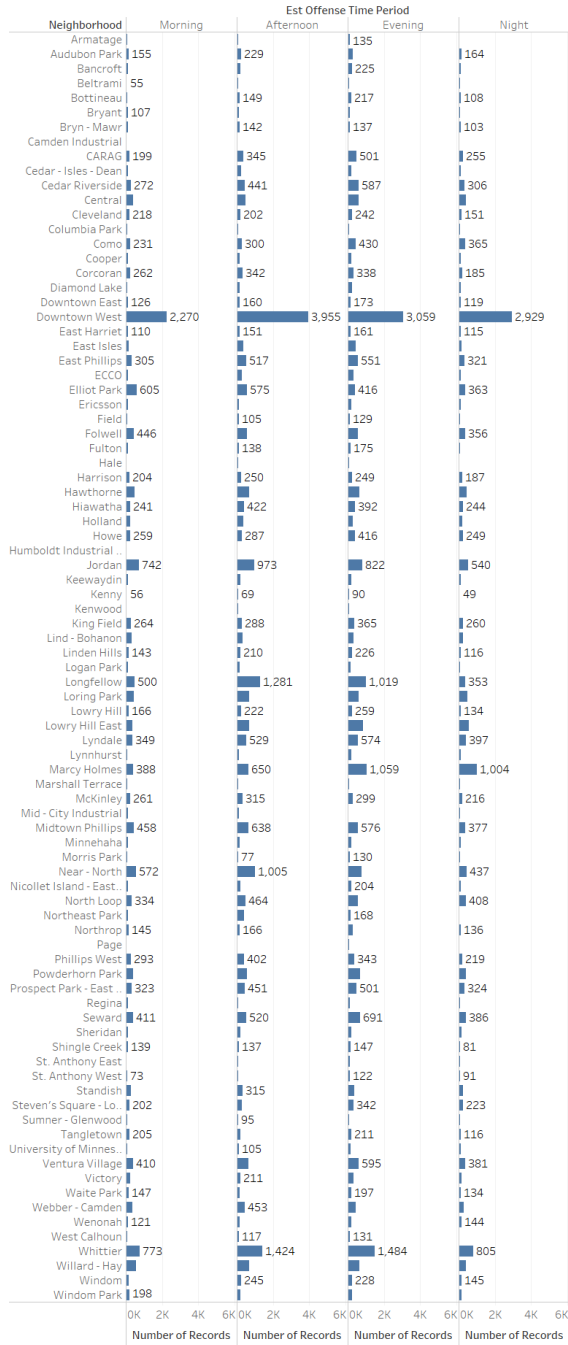


safe\_unsafe\_nodowntown



And individually divided the day into 4 sessions – Morning , Afternoon , Evening and Night to see at what time in the hood the offenses happens the most

offense trends in a day for neighborhoods



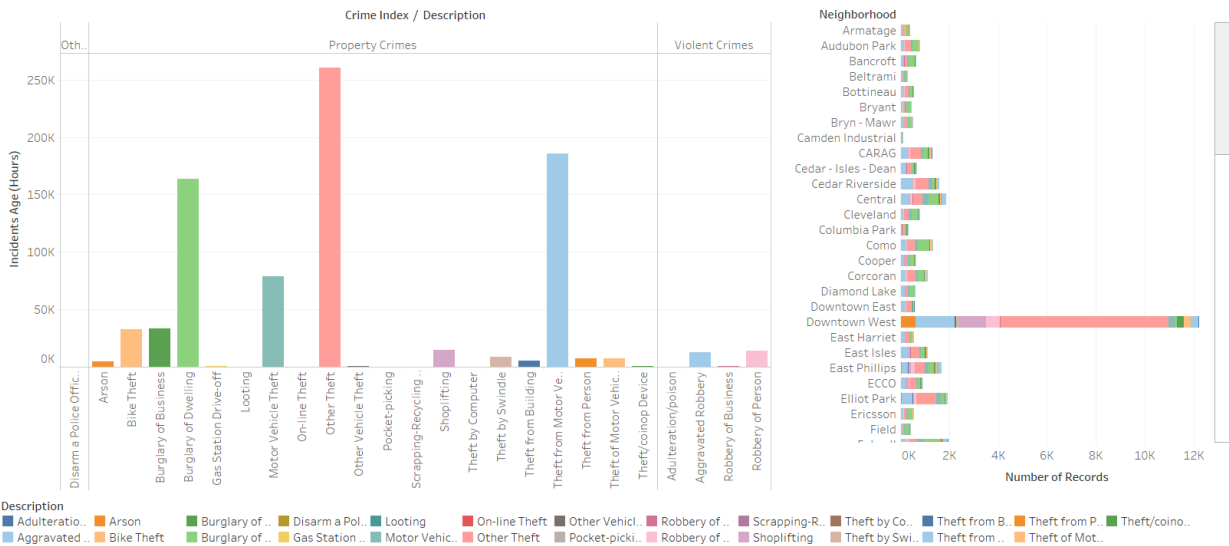
Sum of Number of Records for each Neighborhood broken down by Est Offense Time Period. The marks are labeled by sum of Number of Records.



The below dashboard helps us to find the individual offenses occurred in the neighborhood

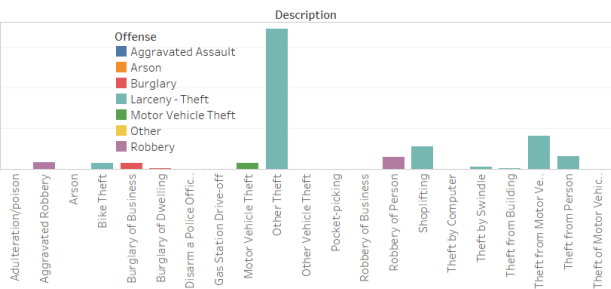
CRIME DESCRIPTION

description of crime

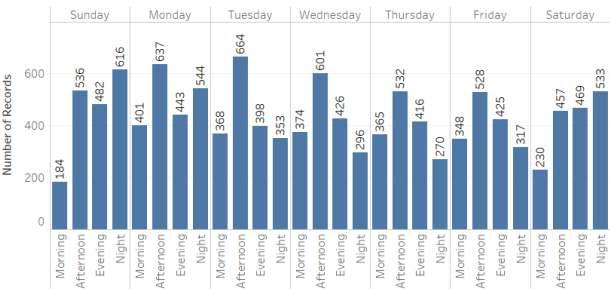


As **Downtown west** has highest outlier it doesn't mean that other neighborhoods are safe, so we excluded the downtown to check the other safe and unsafe neighborhoods. As Downtown West has highest offense rate, we made more detailed dashboard on Downtown West to interact with the correlations.

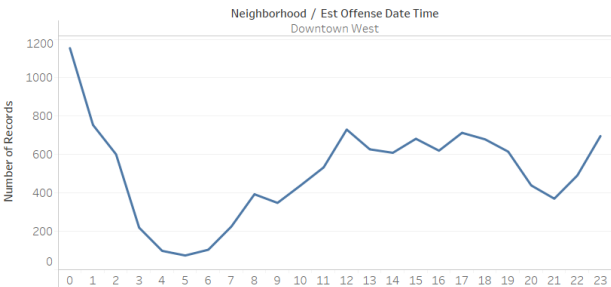
Downtown West Crime



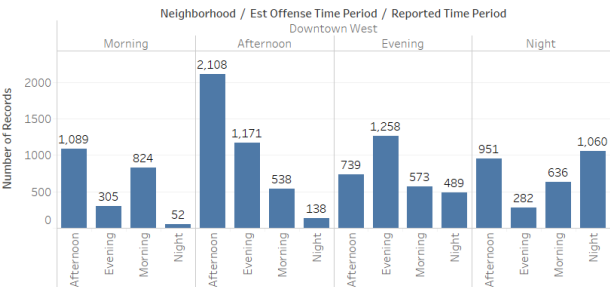
Weekday trends



Weekday trends

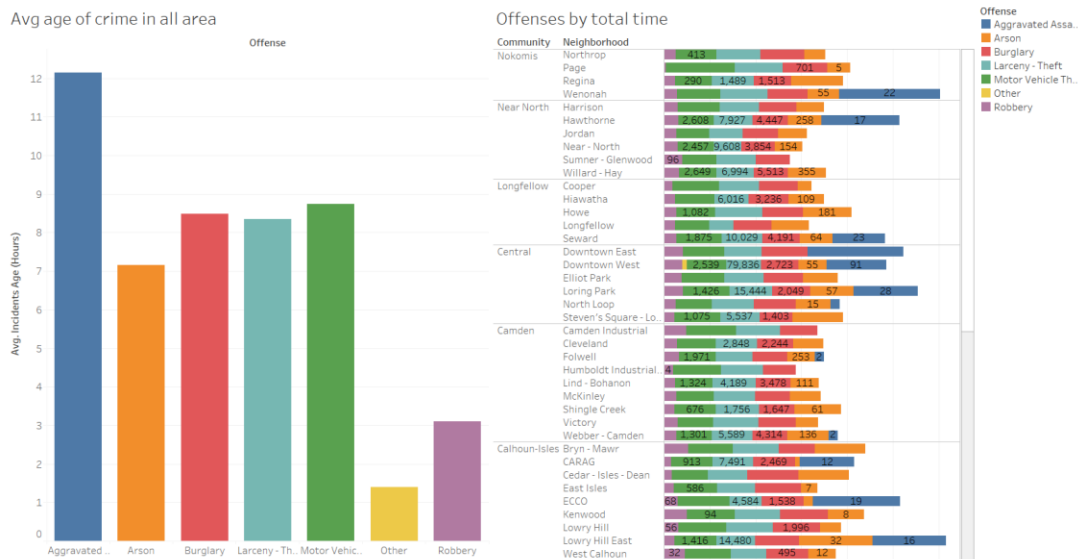


Alertness of crimes in downtown

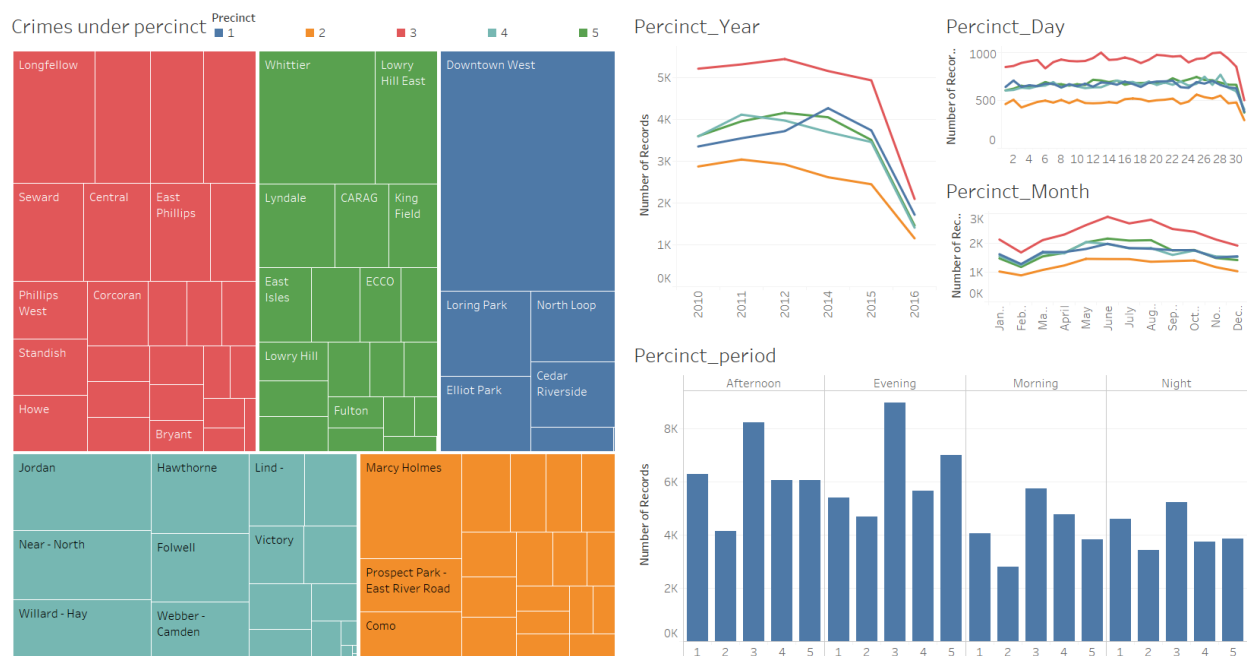


The Downtown West dashboard helped to find that offenses happened mostly on Tuesday afternoon with most offenses happening at 00:00 hours. Most of offenses that occurred on Afternoon period are reported immediately.

The average age for offense that happened in the hood is demonstrated in the below dashboard



As the insights for offenses and the hoods are found, the relation between the precinct ( zone for police purposes) and the offenses trends are visualized in the below dashboard.



## **CHALLENGES**

- Geographic mapping on Tableau was not possible as we did not have the name of the cities in the state of Minneapolis. The data set consisted of latitude and longitude data only which tableau is unable to generate a map based on that data.
- The number of records for each offense was recorded to be 1. This limited our ability to create further co-relations and visualizations
- If the “Other Theft” data field had been more specific as the theft reasons are not mentioned in cleared, more visualizations could have been created.

## **CONCLUSION**

Visualizations are a great technique to extract and analyse information compared to text or numbers, as they tend to display implicit information that would otherwise be overlooked upon. The visualizations created for this project are self-explanatory and informative. We created visualizations to gather information that we were curious about. The project can be expanded to find other co-relations and if needed, more information can be added.