
Gun Violence

Team 4

Final Report

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Vaishnavi Vadlamudi**

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Introduction:

The aim of this project is to understand the drivers of gun violence in Boston's District 4 and compare it to the rest of the city. The project seeks to determine the rate of gun violence in the district, identify patterns in terms of location and type of violence, and analyze existing programs meant to curb violence. Additionally, the project aims to incorporate Environmental/Community Factors, specifically focusing on Green Space, Tree Canopy, Community Programming, Interactions, and Pedestrian/Mobility data. The inclusion of these factors provides a more comprehensive analysis of the community's environmental health and well-being, its impact on mobility and access to public transit, and promotes sustainability, equity, and well-being in the community.

Gun violence has been on the rise among the youth in Boston's District 4, which is a cause of concern for Councilor Worrell. The project will use various data sets and sources, such as police records of violence/firearm activity, discipline records from schools, and police presence to analyze the problem. The team will also gather additional data sets related to schools, environmental/community factors, and interactions to gain a better understanding of the issue. The results of this analysis will inform policies that can be beneficial for improving the district.

Overarching Project Questions:

1. What are the drivers of violence in District 4? How does this compare to the rest of the city?
2. What is the rate of gun violence in District 4? How does this compare to the rest of the city?
3. Are there patterns of violence in terms of location in District 4? How does this compare to the rest of the city?
4. Are there patterns in terms of the type of violence in District 4? How does this compare to the rest of the city?

Extension Questions:

5. What is the distribution and accessibility of green spaces, such as parks and conservation areas, in the community?
6. Are there any disparities in access based on socioeconomic or demographic factors?
7. What is the extent and health of the tree canopy in the community? How does it vary across different neighborhoods or areas?
8. What community programming, such as community centers or programs, are available in the community? Are there any gaps or disparities in access to community programming?
9. How do different factors, such as routes from schools to public transit stops or proximity to transit stops, influence mobility patterns and access to public transportation?
10. What are the pedestrian and mobility patterns in the community? Are there any safety or accessibility concerns for pedestrians or other mobility options, such as bikes or scooters?

Analysis and Findings:

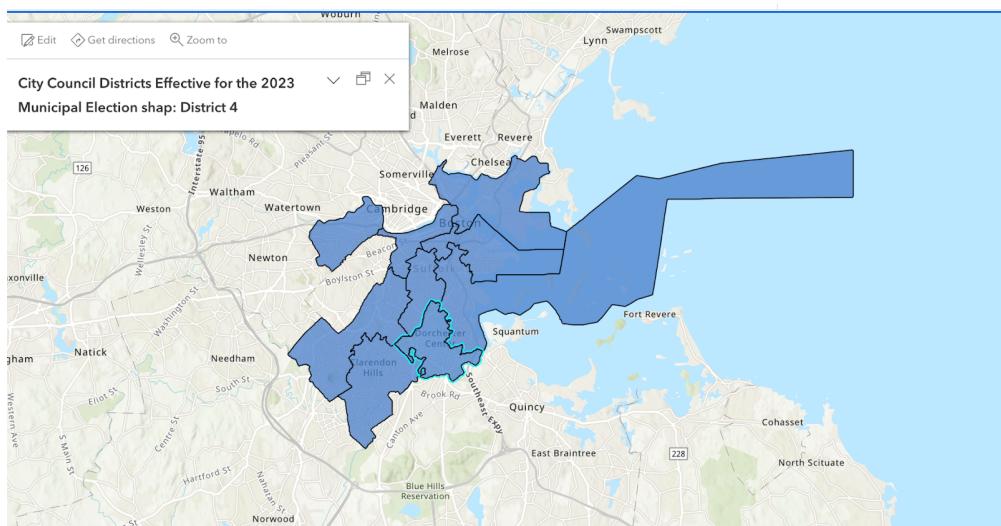
For Deliverable 1, we focused on the following question

- What is the rate of gun violence in District 4? How does this compare to the rest of the city?
- Are there patterns of violence in terms of location in District 4? How does this compare to the rest of the city?

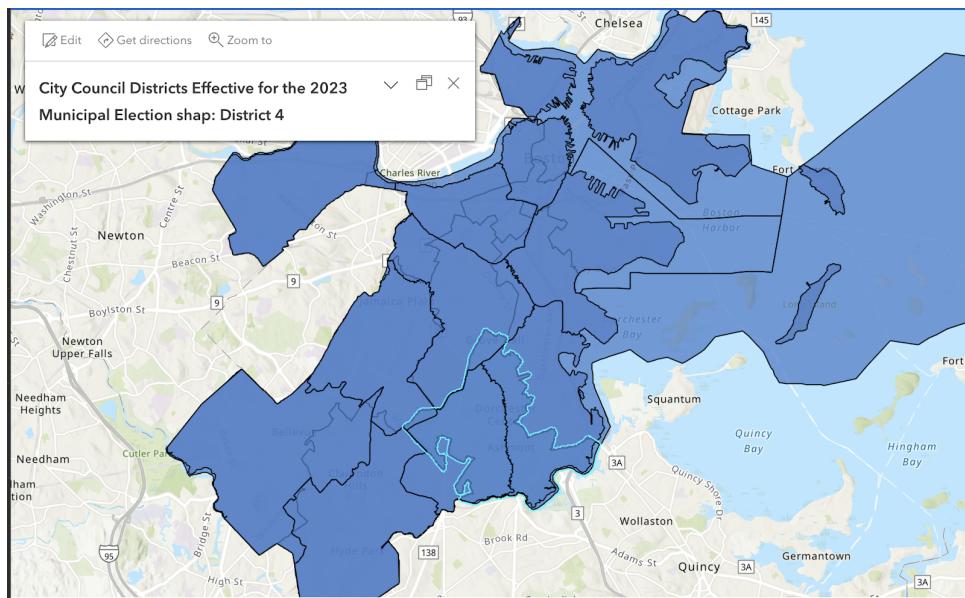
Deliverable 1:

we worked with the following data:

1. Districts for City Council Shapefile

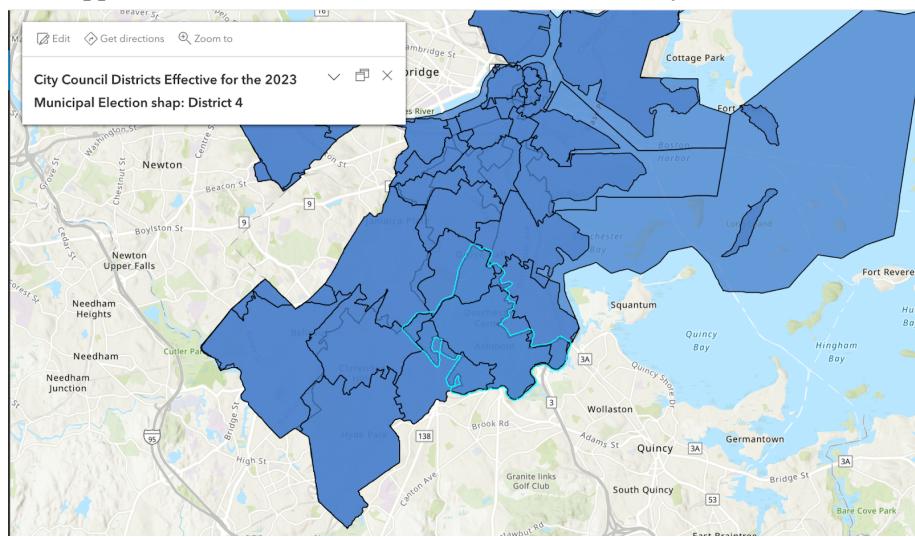


2. Police Records of Violence/Firearm Activity [Shots Fired](#) and [Shootings - Datasets - Analyze Boston](#) (Patrick)
3. Police report: [Crime Incident Reports - Datasets - Analyze Boston](#) (Snigdha and Vaishnavi)
 - a. For 2,3, we looked at the [Boston City Police Districts shapefile](#) (2 ii)
 - b. Overlapped the above shape file with the city council shape file



- c. We used the above 4 Police Districts (B3, C11, E13, B2) which overlap with city council district 4 to represent D4.
4. Police Presence: [BPD Field Interrogation and Observation \(FIO\) - Datasets - Analyze Boston](#) (Tarek)
 - a. As the above data is shown on zipcodes, we looked at the [Boston City Zipcode shapefile](#)

b. Overlapped the above with the city council shape file



c. The overlapping zip codes are :

- i. 02124 (most of the district)
- ii. 02131
- iii. 02126
- iv. 02121
- v. 02122

Patrick Wright:

- File for Deliverable 1: gun_violence_PatW.ipynb
- Worked with Police Records of Violence/Firearm Activity data
- Used [Shots Fired](#) and [Shootings - Datasets - Analyze Boston](#) and plotted the following
 - “Proportions of Shootings in District 4 vs. All Other Districts since 2015”
 - “Proportions of Shootings in Police Districts of District 4 since 2015”
 - “Proportions of Shots Fired in District 4 vs. All Other Districts”
 - “Proportions of Shots Fired in Police Districts of District 4 since 2015”

Snigdha Reddy Pulim:

- File for Deliverable 1: crime_patterns_per_PD_snigdha.ipynb
- Worked with Police reports data
- Used [Crime Incident Reports - Datasets - Analyze Boston](#) and plotted the following:
 - “no of crime reports by type of crime” for each of the 4 Police Districts, Boston City and all other districts
 - “Crime rate of each district/ Crime rate of Boston City for each type of crime” for each of the 4 Police Districts, Boston City and all other districts
 - “no of crime reports (by type of crime) outside of each district against in the district”

Tarek Mourad:

- File for Deliverable 1: Field_Contacts_Data.ipynb
- Worked with the Police Presence data
- Used [BPD Field Interrogation and Observation \(FIO\) - Datasets - Analyze Boston](#) to plot:

- Top 25 zip codes by the count of BPD contact

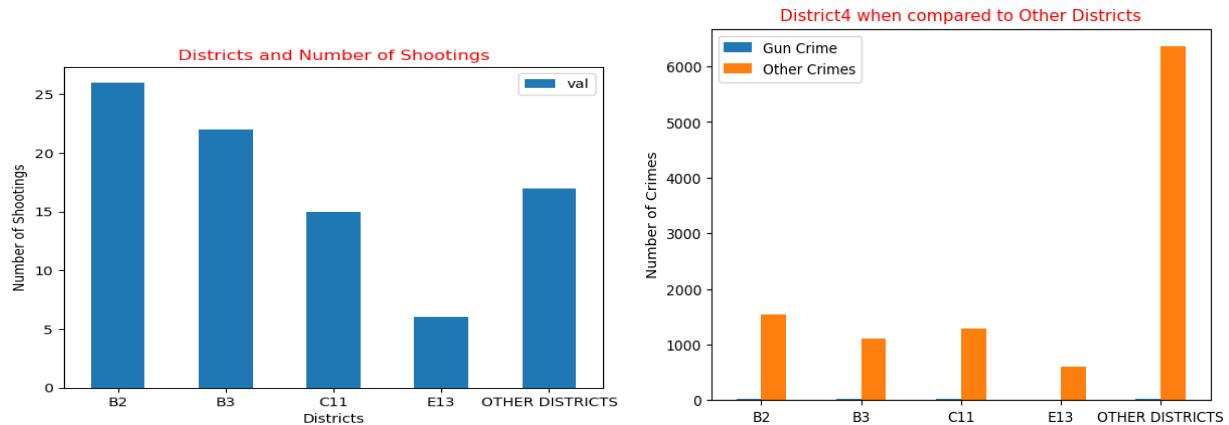
Vaishnavi Vadlamudi:

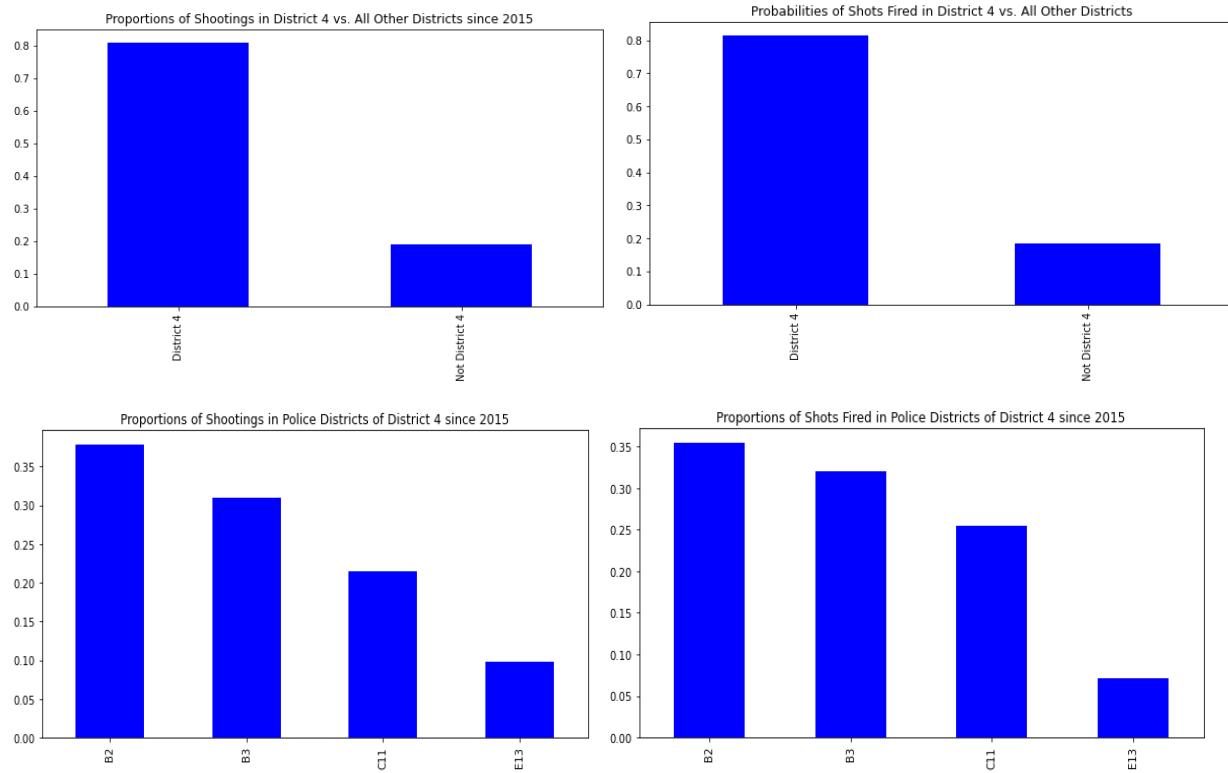
- File for Deliverable 1:
 - ReadingShapeFiles_Vaishnavi.ipynb
 - CrimeIncidentReport_Vaishnavi.ipynb
- Worked on [Shapefile](#) and plotted shapefiles in ReadingShapeFiles_Vaishnavi.ipynb
- Worked with Police reports data
- Used [Crime Incident Reports - Datasets - Analyze Boston](#) and plotted the following:
 - “Districts and Number of Shootings”
 - “District4 when compared to Other Districts”
 - “District 4 vs Number of Crimes”
 - “Districts and Number of Crimes”
 - “Ratio of Gun Crime”
 - “Ratio of Other Crime”
 - “Ratio of Gun Crime”
 - “Districts vs Gun Crimes over All Crimes”

Key Question:

What is the rate of gun violence in District 4? How does this compare to the rest of the city?

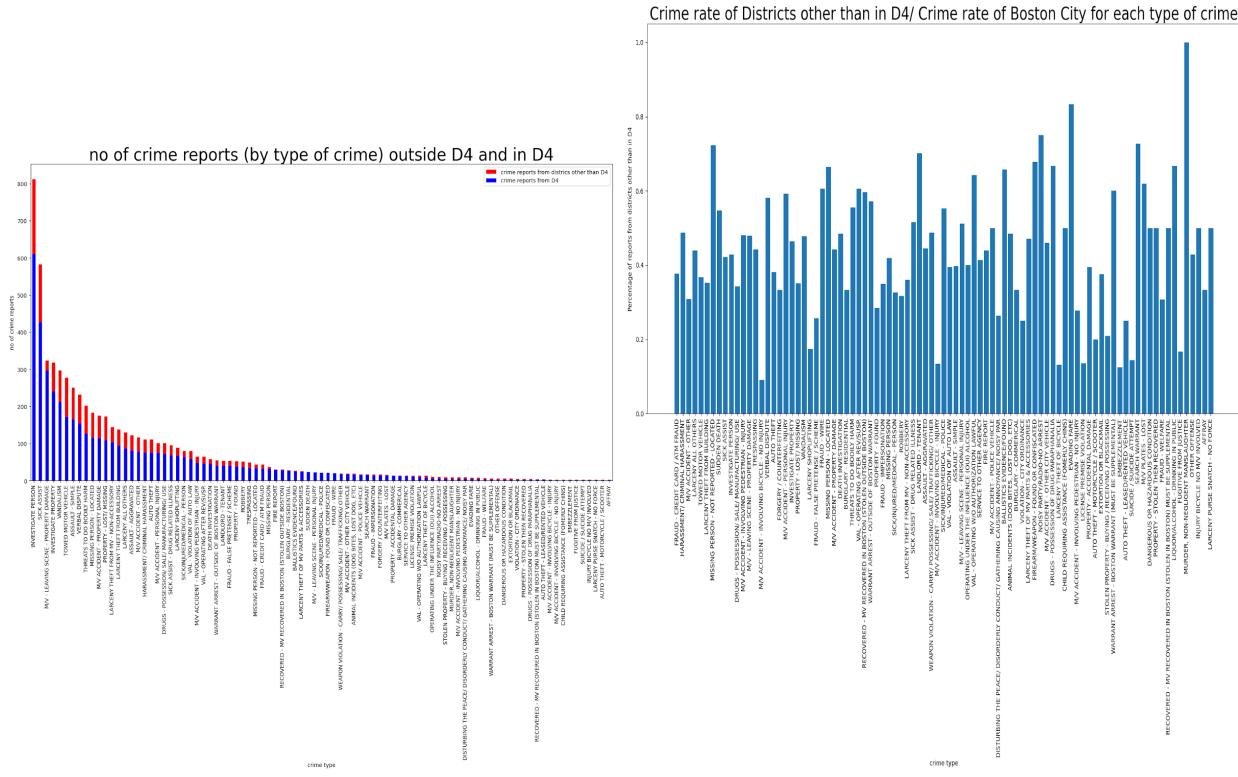
- As shown in





Are there patterns of violence in terms of location in District 4? How does this compare to the rest of the city?

- As shown:



Deliverable 2:

Key questions:

- What is the rate of gun violence in District 4? How does this compare to the rest of the city?
 - Are there patterns of violence in terms of location in District 4? How does this compare to the rest of the city?

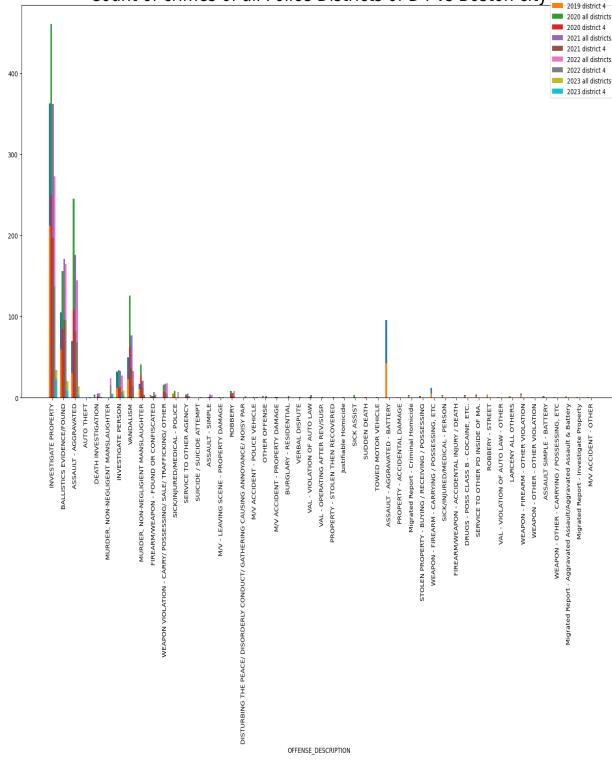
Individual Contributions and Observations:

Snigdha Reddy Pulim:

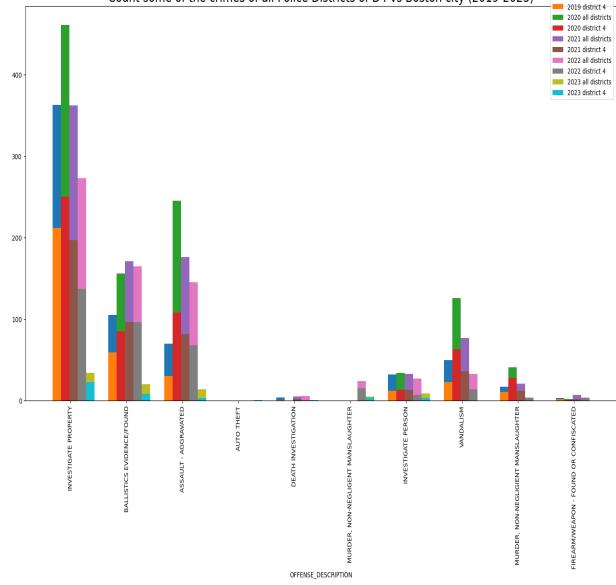
Question analyzed: Are there patterns of violence in terms of location in District 4? How does this compare to the rest of the city?

- Data :
 - [CRIME INCIDENT REPORTS](#) from 2019-2023
 - Jupyter notebook file:
 - File: shooting_crime_patterns.ipynb
 - Location: code / shooting_crime_patterns.ipynb
 - Key Graphs :

Count of crimes of all Police Districts of D4 vs Boston city



Count some of the crimes of all Police Districts of D4 vs Boston city (2019-2023)

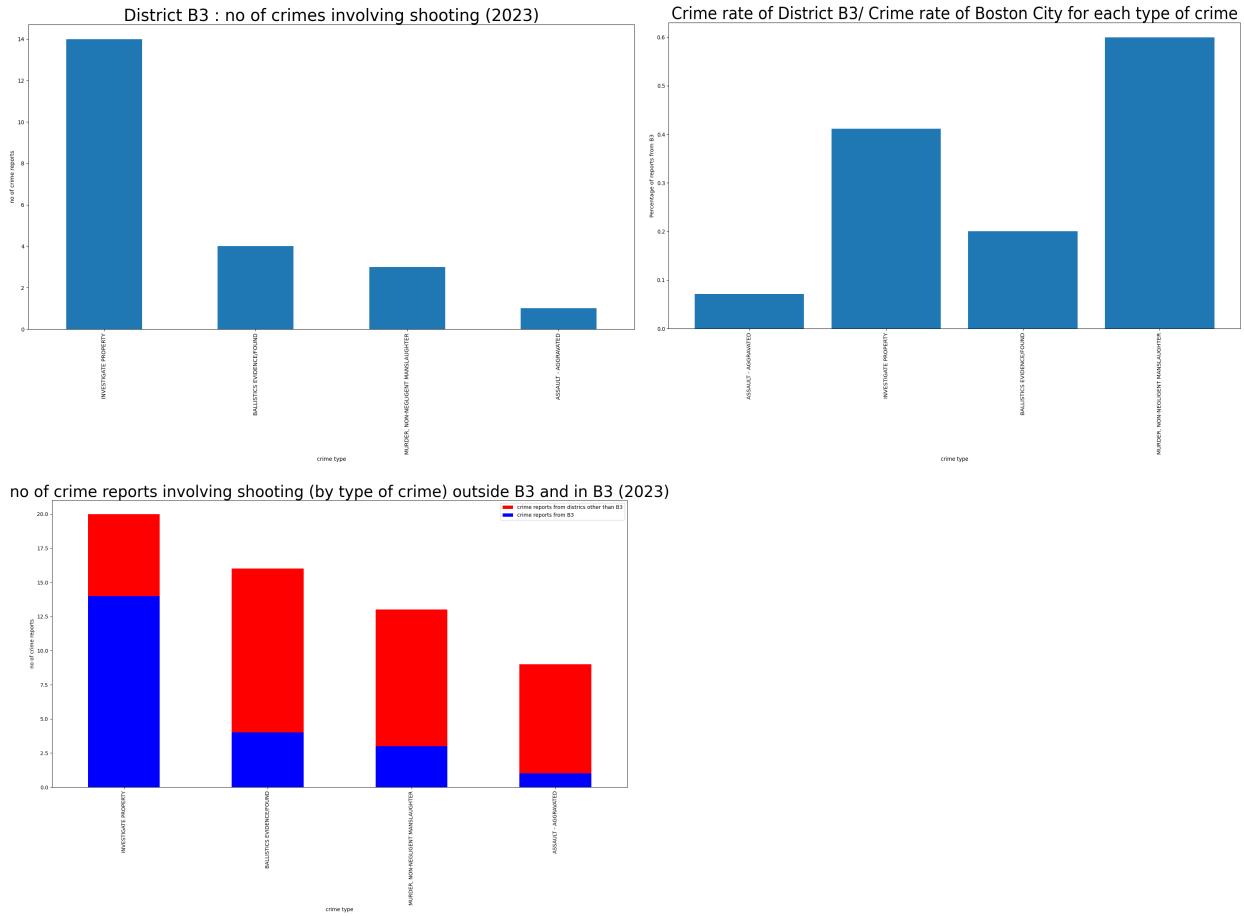


➤ Observations:

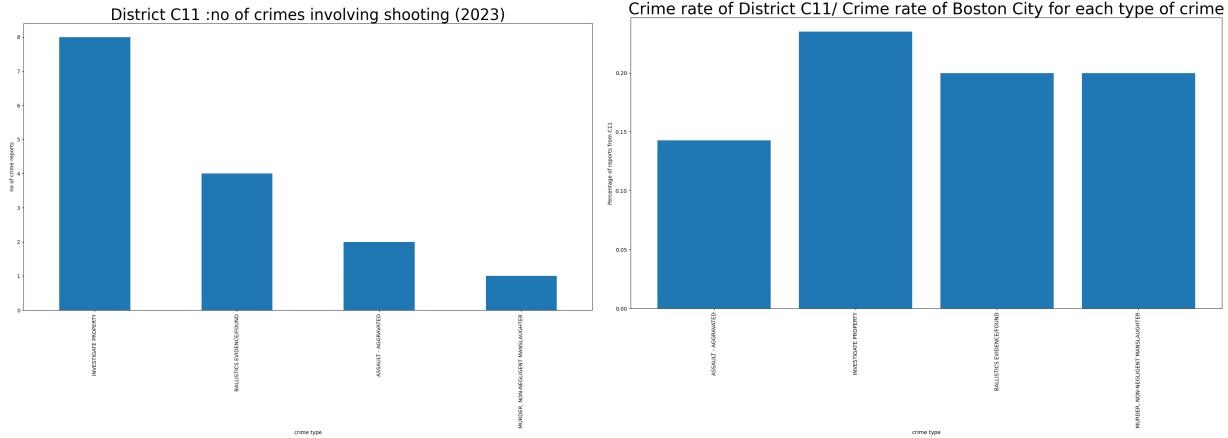
- Based on the “Count of crimes of all Police Districts of D4 vs Boston city” graph, the most frequent crimes involving shooting are:
 - Investigate Property
 - Ballistics evidence / Found
 - Assault - Aggravated
 - Vandalism
 - Investigate Person
 - Murder, Non-Negligent Manslaughter
- From the “Count of some Crimes of all Police Districts of D4 vs Boston City (2019-2023)” data, it is evident that:
 - Both D4 and the rest of the city experienced a significant decrease in crime rate starting in 2020. However, for Ballistics evidence, this decrease began in 2021.
 - 2020 witnessed a significant increase in most types of crimes, leading to a peak for all crimes. This could be a possible response to the lockdown measures.

➤ Other graphs plotted on the same data:

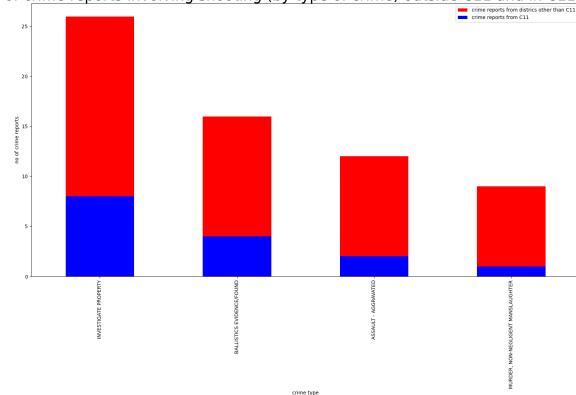
- Crimes involving shooting in B3 :



○ Crimes involving shooting in C11:

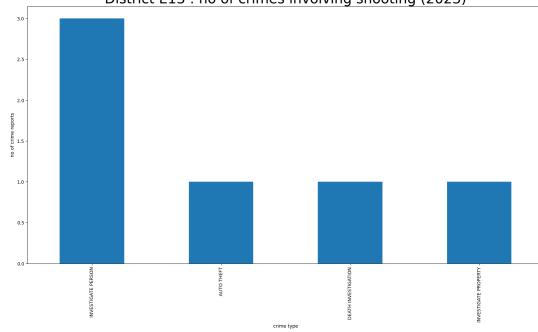


no of crime reports involving shooting (by type of crime) outside C11 and in C11 (2023)

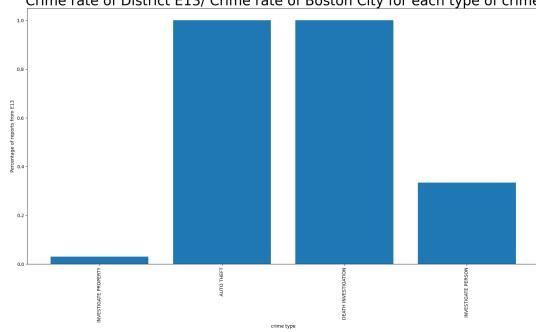


○ Crimes involving shooting in E13:

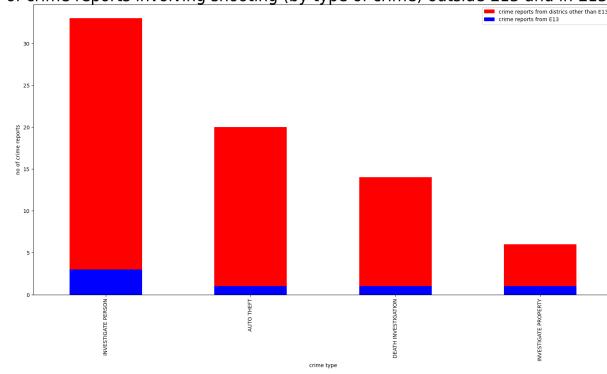
District E13 : no of crimes involving shooting (2023)



Crime rate of District E13/ Crime rate of Boston City for each type of crime

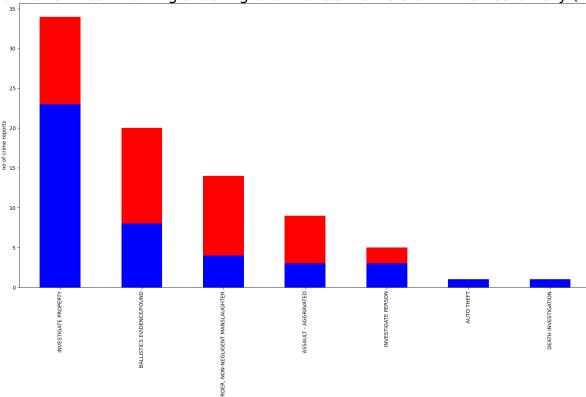


no of crime reports involving shooting (by type of crime) outside E13 and in E13 (2023)



○ Crimes involving shooting for D4 and all districts:

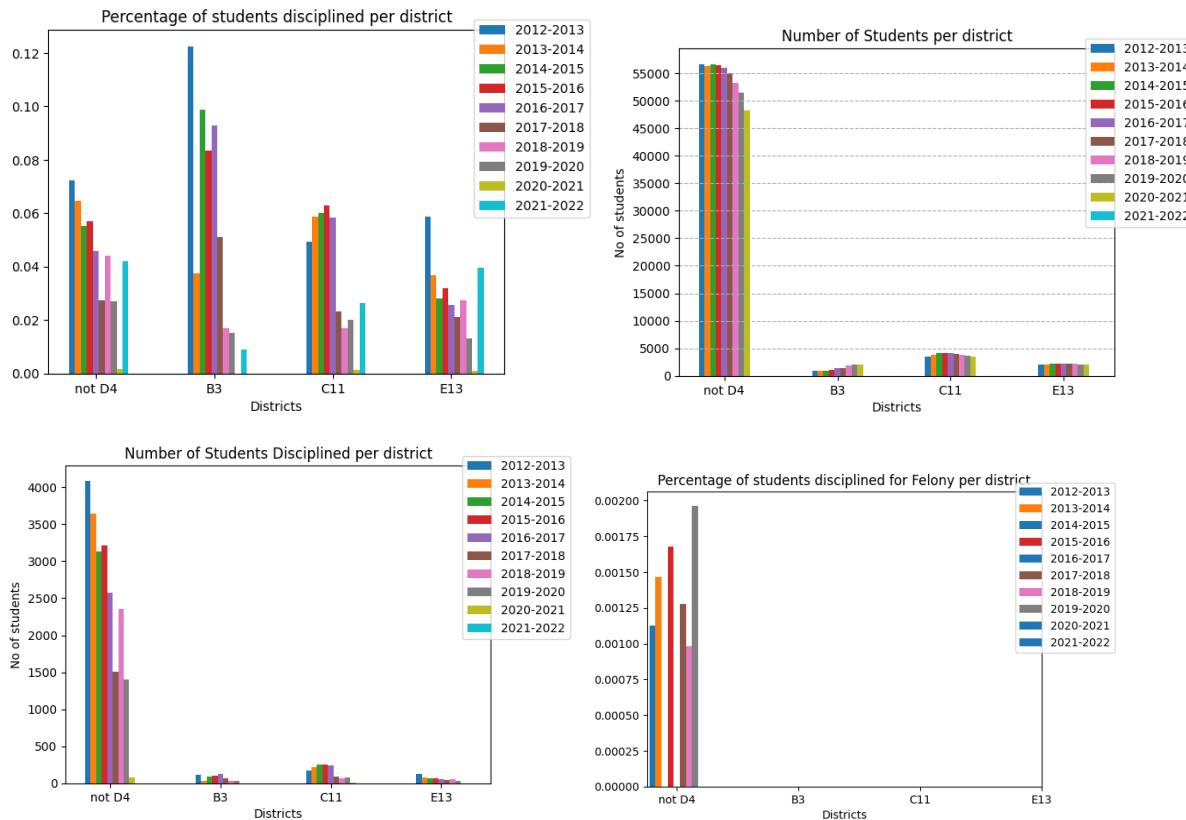
Count of crimes involving shooting of all Police Districts of D4 vs Boston city (2023):



- As seen in the above police districts' crime (involving shooting) data, E13's addition to the crime rate of D4 is very small.
 - For 2023 data:
 - The top crimes in B3 and C11 are:
 - Investigate Property
 - Ballistics evidence / Found
 - Murder, Non-Negligent Manslaughter
 - Assault - Aggravated
 - For E13:
 - Investigate Person
 - Auto Theft
 - Death Investigation
 - Investigate Property

Additional analysis: Student Discipline Data Report analysis

- Data :
 - [Student Discipline Data Report](#) from 2012-2022
 - Jupyter notebook file:
 - File: student_discipline.ipynb
 - Location: code / student_discipline.ipynb
 - Key Graphs :



➤ Observations:

- Based on the "Percentage of Students Disciplined" metric:
 - B3 had the highest percentage of students being disciplined until the 2017-2018 academic year.
 - However, the percentage has decreased significantly since 2018-2019 and has continued to consistently decrease.
 - C11 has a higher percentage of students being disciplined.
 - Nonetheless, C11 has maintained a lower percentage since 2017-2018.
- Based on the "Number of Students per District" metric:
 - Non-district4 schools have shown a slight decrease in the number of students each year since 2014-2015.
 - B3 has experienced an increase or maintained a similar student count over the years.
 - E13 has maintained its student count while C11 has followed the pattern of non-district4 schools.
- From the "Number of Students Disciplined per District" metric, it can be observed that there has been a decrease in the number of students disciplined across District 4 since the 2016-2017 academic year.
- Based on the "Percentage of Students Disciplined for Felony per District" metric, there have been no students disciplined for felony convictions or complaints in District 4 between 2012 and 2022.

Vaishnavi Vadlamudi (U19250166)

Questions analyzed:

What is the rate of gun violence in District 4?

How does this compare to the rest of the city?

Are there patterns of violence in terms of location in District 4?

Data:

[Crime Incident Reports - Datasets - Analyze Boston](#) (under Police Reports)

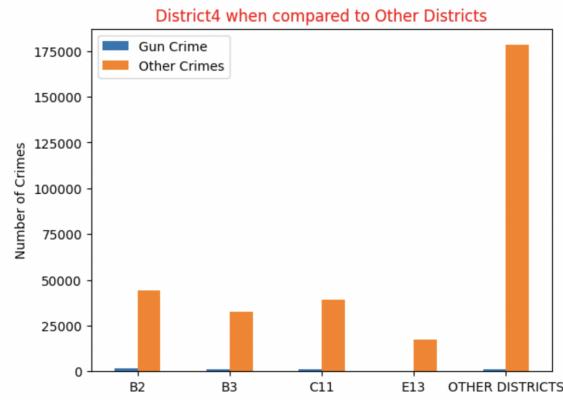
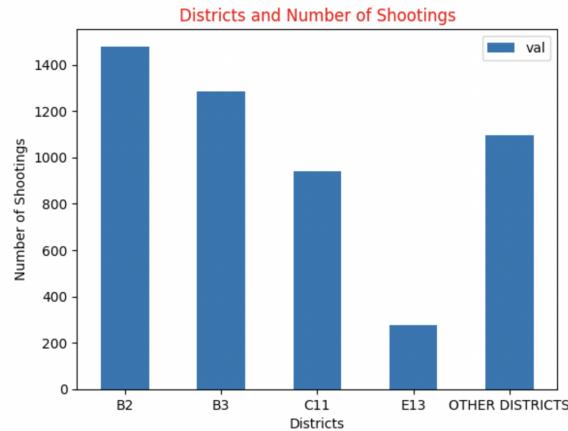
Jupyter Notebooks Contributed:

File: CrimeIncidentReport_AllYears_Vaishnavi.ipynb

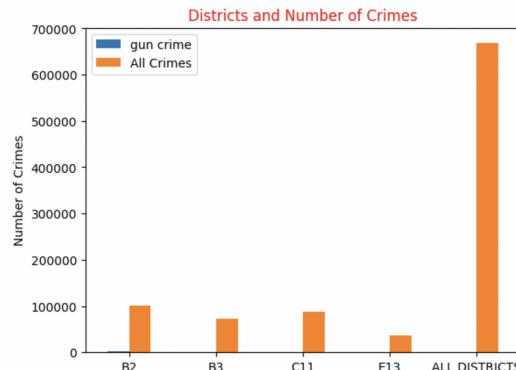
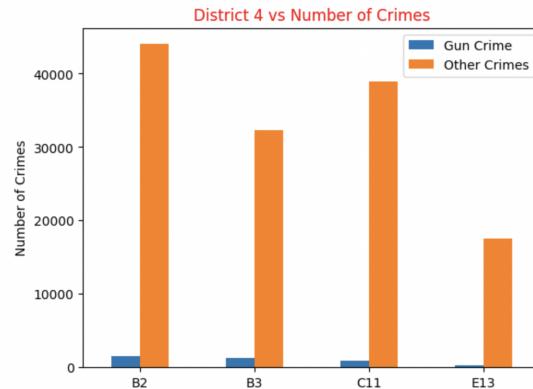
Location: code / CrimeIncidentReport_AllYears_Vaishnavi.ipynb

Key Graphs and Insights:

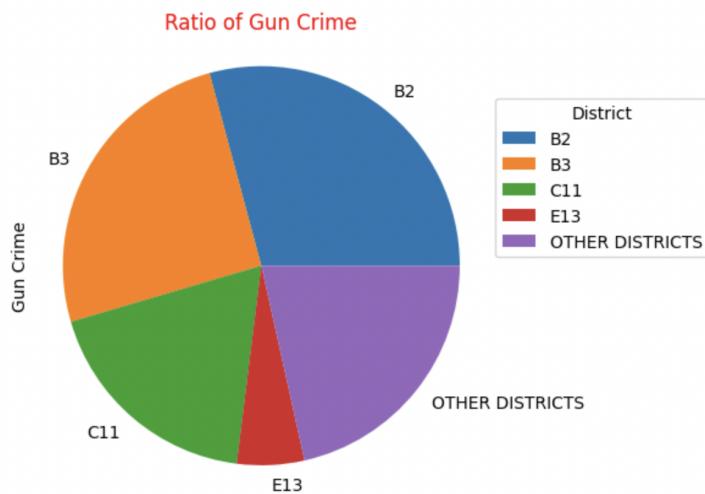
The below graph illustrates Districts B2, B3, C11, E13 and their respective number of shootings through out the past 7 years. The below graph illustrates District 4 crimes(All Crimes) when compared to the rest of the districts.



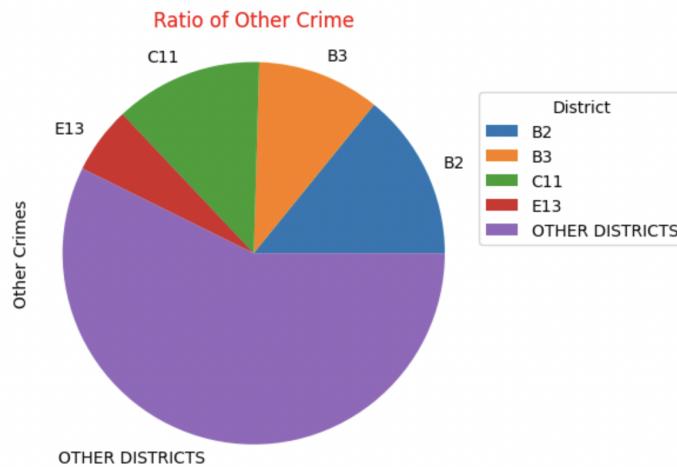
The below graph illustrates District 4 Gun crimes when compared to the other crimes. The below graph illustrates District 4 crimes when compared to the rest of the city.



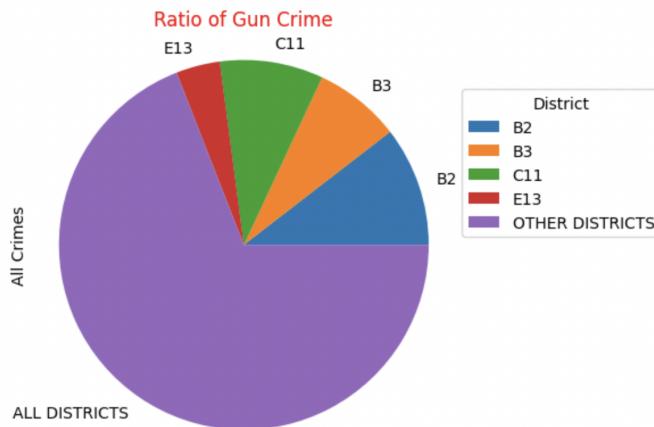
The below pie chart illustrates the Ratio of Gun Crime in District 4 when compared to the rest of the city.



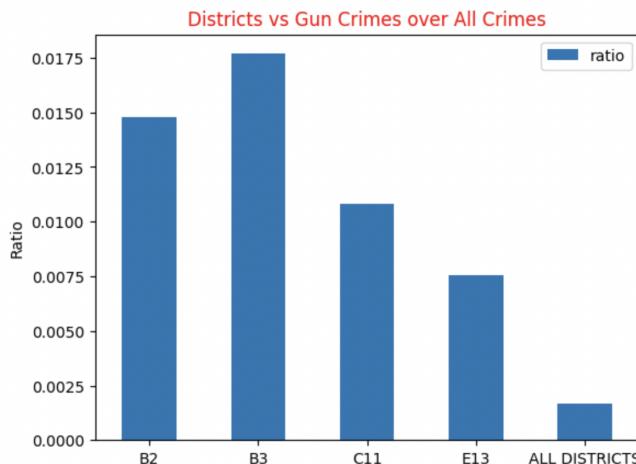
The below pie chart illustrates ratio of other crimes in District 4 when compared to the rest of the city.



The below pie chart illustrates ratio of all crimes in District 4 when compared to the rest of the city.



The below bar graph illustrates the ratios of gun crimes over all crimes in District 4 and the rest of the city.



Observations and Key Insights:

TRENDS OF REPORTED GUN CRIME:

It appears that the numbers are decreasing in a consistent trend over the past few months.

However, we can calculate the year-on-year growth rate to identify any patterns.

Year-on-year growth rates:

From 2015 to 2016: $((302-196)/196)*100 = 54.08\%$

From 2016 to 2017: $((352-302)/302)*100 = 16.56\%$

From 2017 to 2018: $((318-352)/352)*100 = -9.66\%$

From 2018 to 2019: $((647-318)/318)*100 = 103.77\%$

From 2019 to 2020: $((889-647)/647)*100 = 37.39\%$

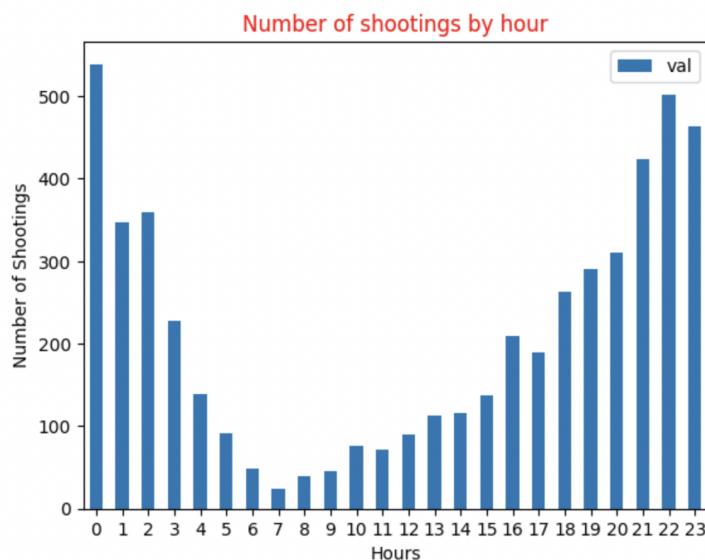
From 2020 to 2021: $((713-889)/889)*100 = -19.80\%$

From 2021 to 2022: $((529-713)/713)*100 = -25.80\%$

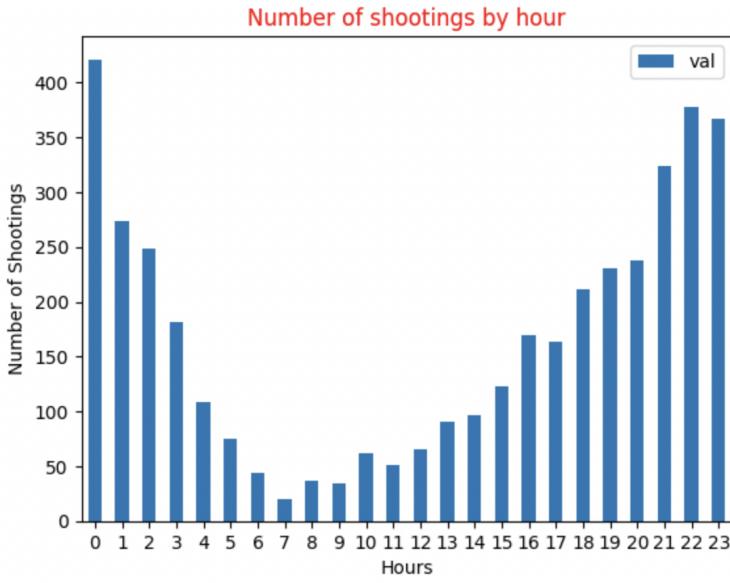
Based on the above calculation, we can see that the year-on-year growth rate has been decreasing over the past few years. This suggests that the trend has been slowing down, and the numbers are not growing as quickly as they have in the past. However, as noted earlier, the latest observation for February 2023 is lower than the previous year's observation, suggesting a decrease in the trend.

Additional Analysis:

The below graph is for the number of shootings per hour all the districts through out the last 7 years.

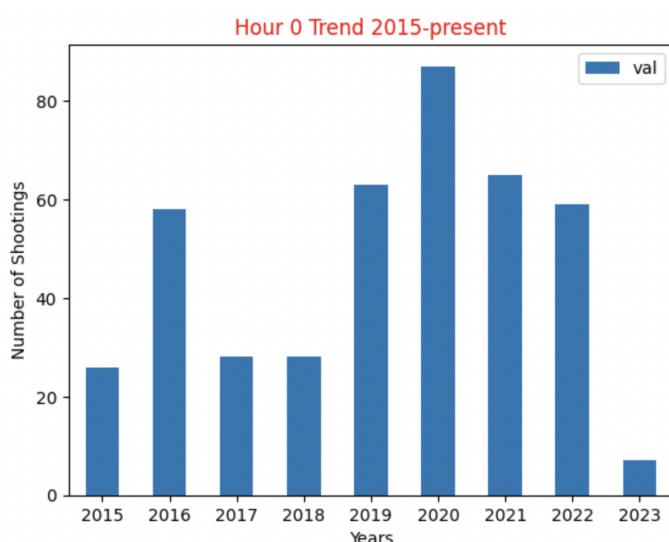


The Below bar graph illustrates the number of shooting per hour in district 4 throughout the past 7 years.



Hour 0 trend in District 4 in the past 7 years.

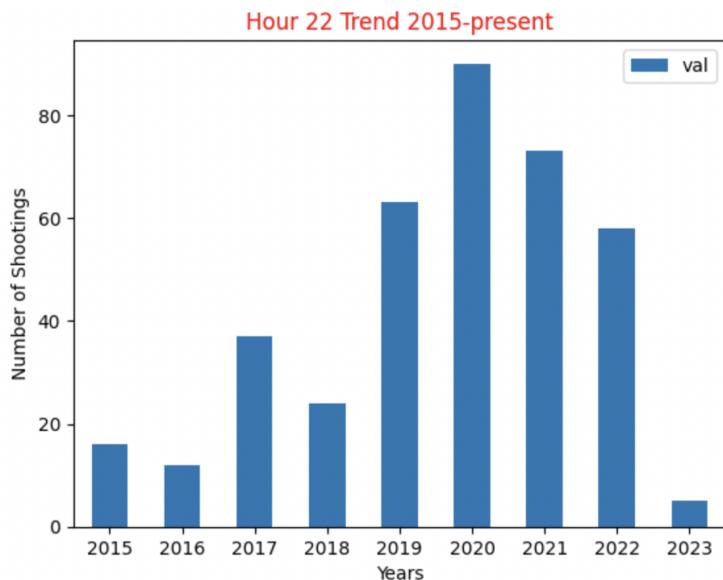
The number of shootings range from 26 to 87. The mean is 49.25. The standard deviation is 23.38. We can say that the data is moderately spread out with a slightly skewed distribution towards the lower end.



The below bar graph illustrates the Hour 22 Trend in the past 7 years.

The number of shootings in Hour 22 ranges from 12 to 90. The mean is 47.125, and the standard deviation is 27.362. The data is moderately spread out, with a slightly skewed distribution towards the higher end.

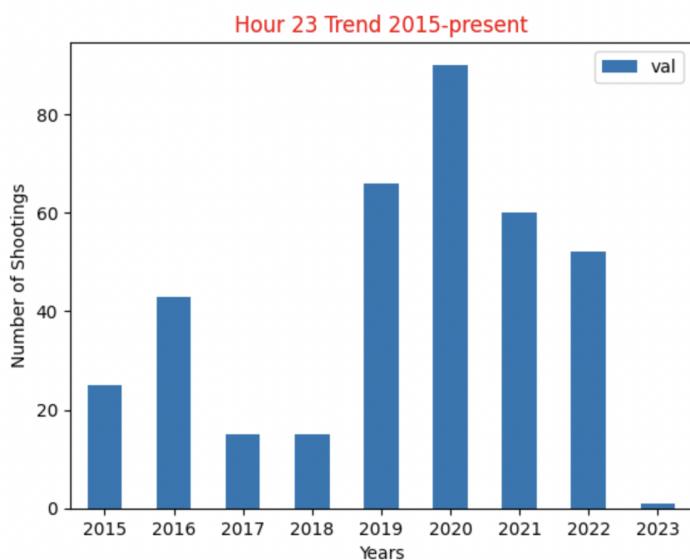
It's worth noting that while the mean for Hour 22 is close to the mean for Hour 0, the range and standard deviation are slightly larger. This suggests that there is more variability in the number of shootings for Hour 22, and the distribution is slightly more spread out than it was for Hour 0.



The below bar graph illustrates the Hour 23 trend in District 4 in the past 7 years.

The number of shootings in Hour 23 ranges from 15 to 90. The mean is 47.5, and the standard deviation is 25.267. The data is moderately spread out, with a slightly skewed distribution towards the higher end.

Compared to Hour 0 and Hour 22, the range of Hour 23 is similar to Hour 22, but the standard deviation is closer to Hour 0. This suggests that there is a moderate amount of variability in the number of shootings for Hour 23, and the distribution is slightly more spread out than it was for Hour 0.



Tarek Mourad (U30214686)

Questions analyzed:

- What are the counts of filed contacts for each year from 2016-2022
- What are the counts of field contacts for each month from 2016-2022
- How are field contacts spread out in districts C11/B3/E13 and D4 from 2017-2022

Data:

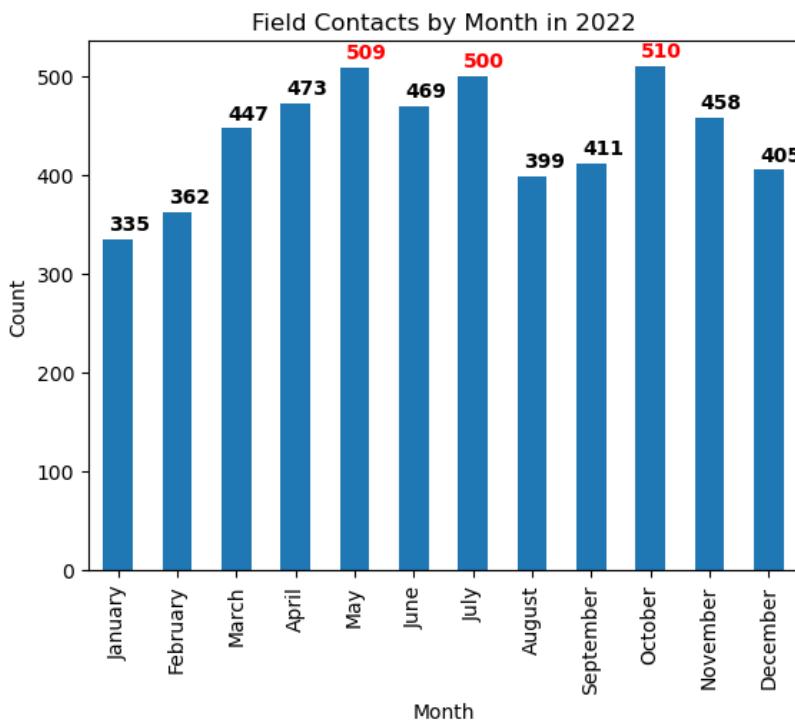
- <https://data.boston.gov/dataset/boston-police-department-fio>
- ^ Data from 2016 until 2022

Jupyter Notebooks Contributed:

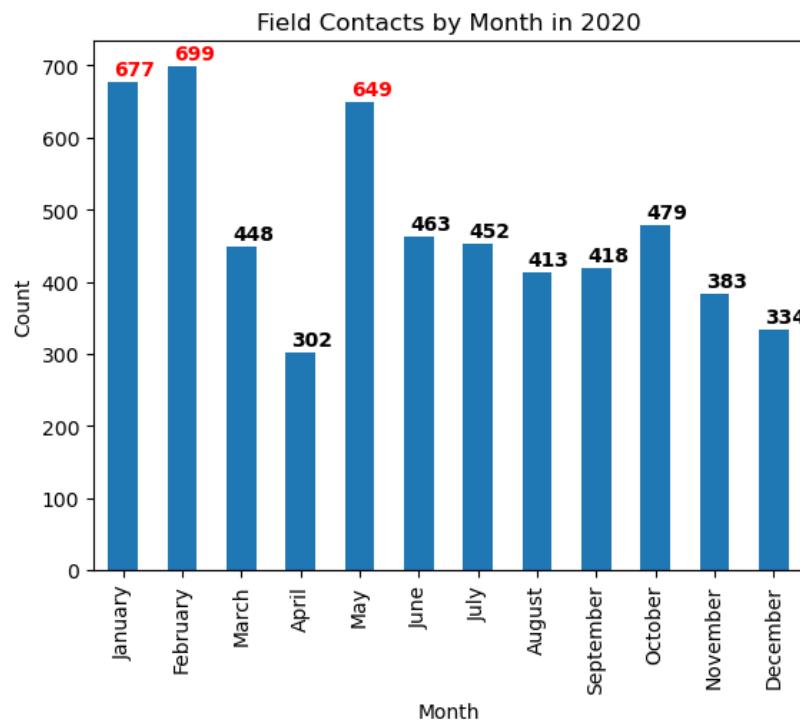
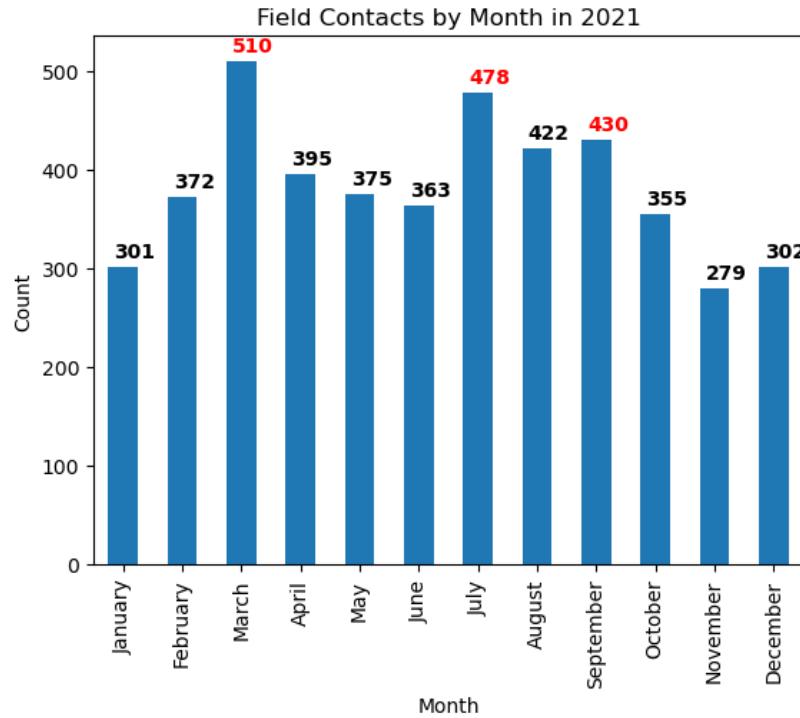
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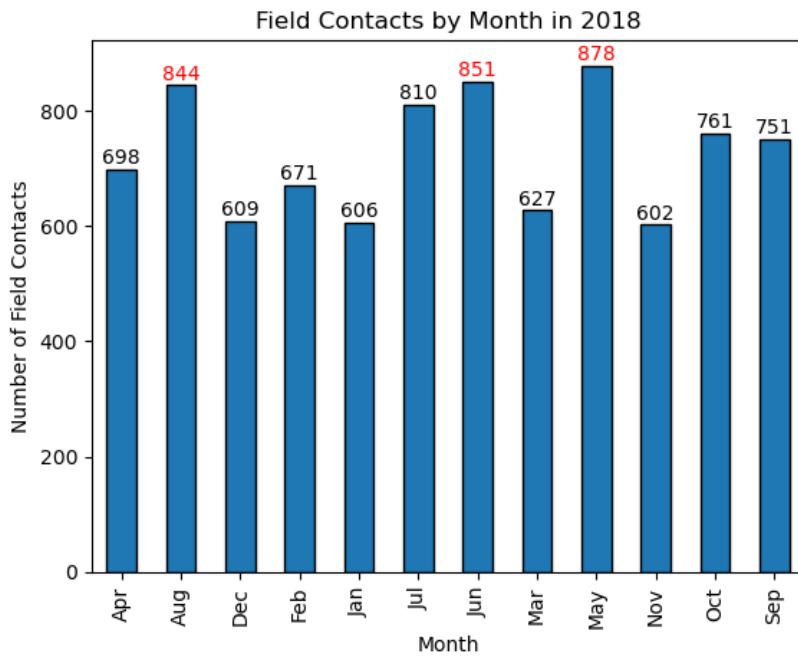
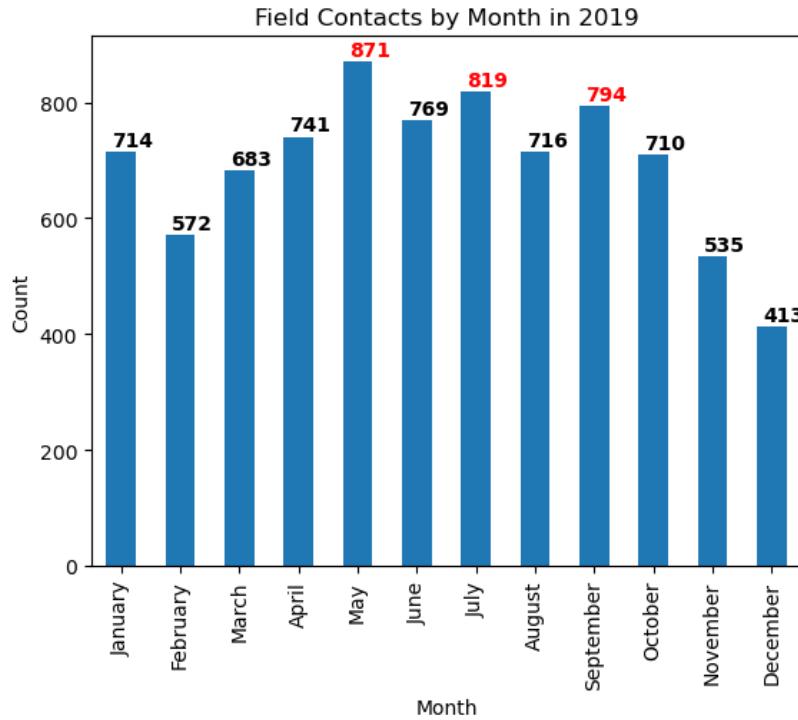
Key Graphs + Insights:

- Field contacts by month for each individual year (2018 until 2022)



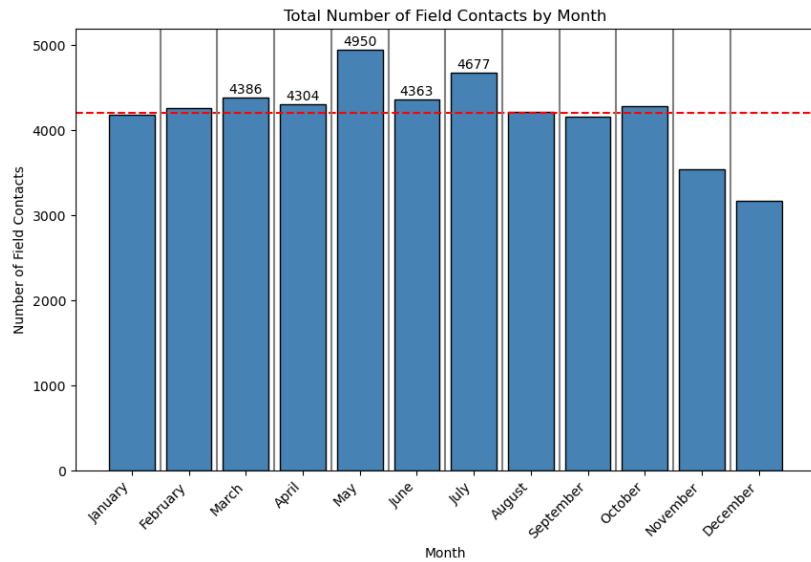
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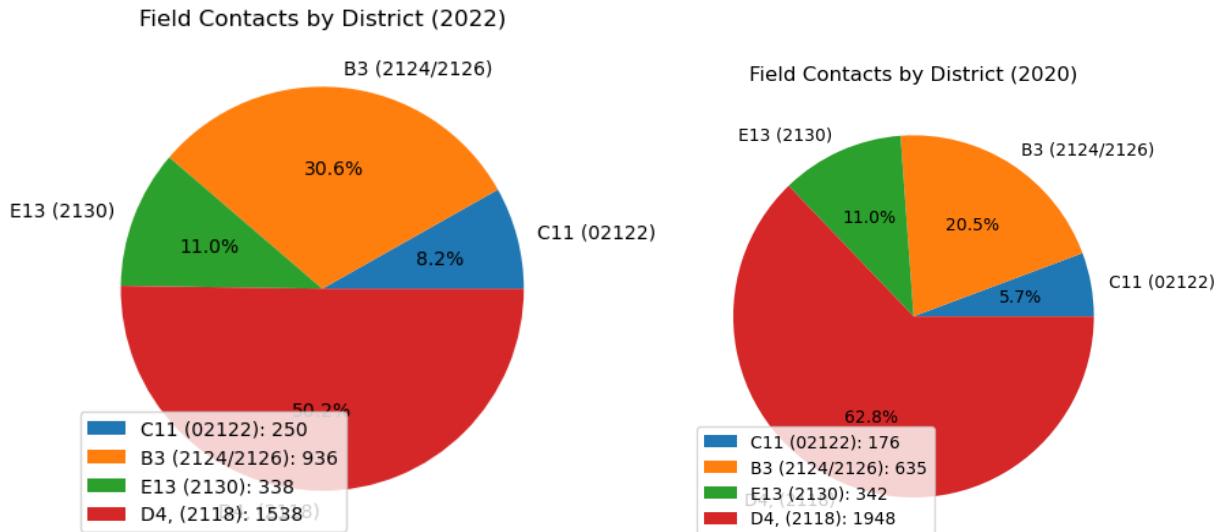


- The 5 charts above represent the count of field contacts for each individual year from 2018 until 2022
- **Key Takeaways:**
 - There are some irregularities from the data that represents the year in which covid appeared.
 - In general, the months with the highest counts of field contacts are in the spring/summertime.

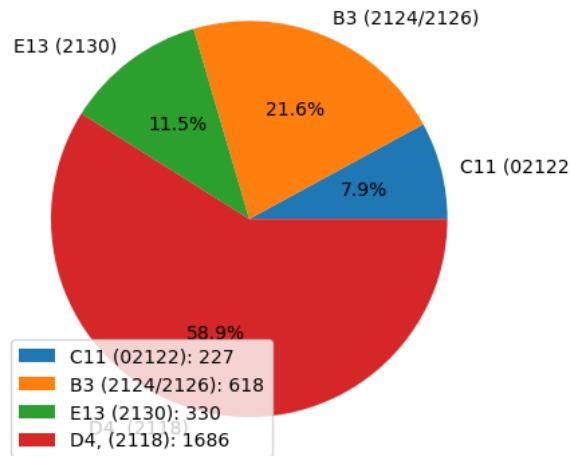
- **Sum of field contacts for each month from 2016 until 2022**



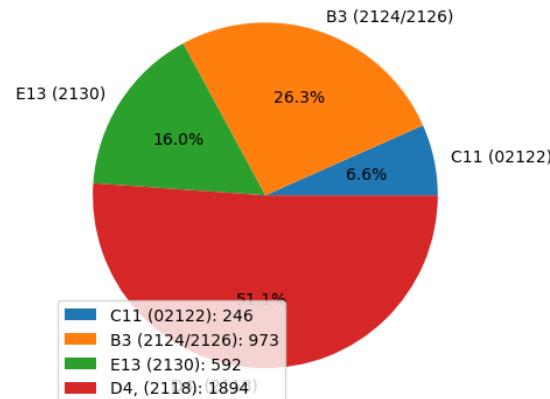
- This chart represents a bar chart of the sum of the counts of field contacts for each month from 2016 until 2022. It has the average count for all months as well as the labeled count of the top 5 months with the most counts of field contacts.
- **Key takeaway:** Top 5 counts for all months all revolve within and around the summer
 - Average counts for all months is around 4200.
- **Field contact pie charts by district (B3/C11/E13/D4) for each individual year from 2017 until 2022**



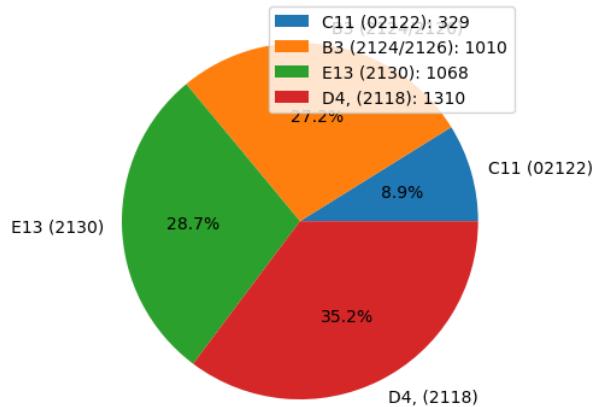
Field Contacts by District (2021)



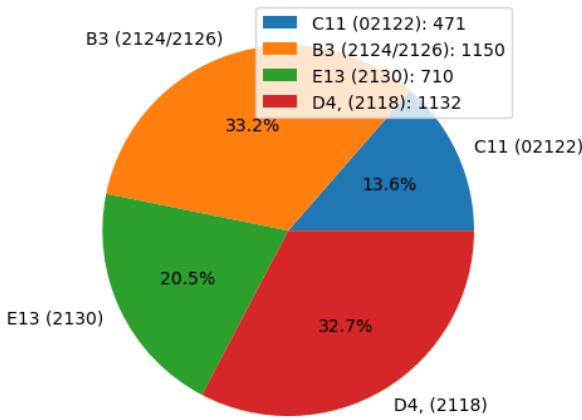
Field Contacts by District (2019)



Field Contacts by District (2018)



Field Contacts by District (2017)



- The 6 pie charts above represent the percentage of field contacts within districts E13, B3, C11 and D4.
- Key takeaways:**
 - District D4 has a much higher number of field contacts compared to other districts
 - District D4 field contacts have increased by almost 100% since 2017.
 - District E13 field contacts have decreased from around 20% to 11%.

Key questions:

- Within district 4, on which days do most shootings occur within our dataset which contains information about all shootings reported from 2015 to about present day?
- Also looking at all the shootings that have taken place just within district 4, what is the number of shootings victims by race per year from 2015 - 2023?
- Lastly, using the same dataset as above, what is the number of shooting victims by gender per year from 2015 - 2023?

Patrick Wright:

Question Analyzed: Within district 4, on which days do most shootings occur within our dataset which contains information about all shootings reported from 2015 to about present day?

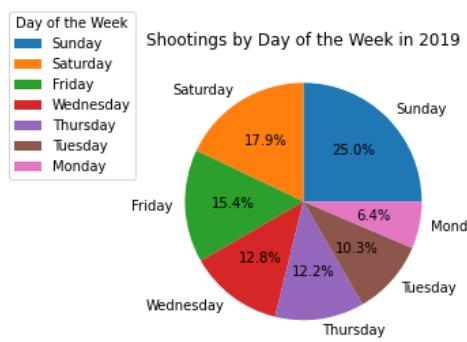
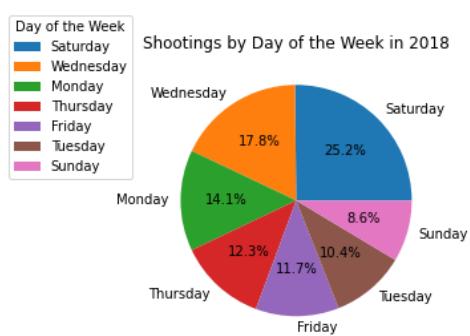
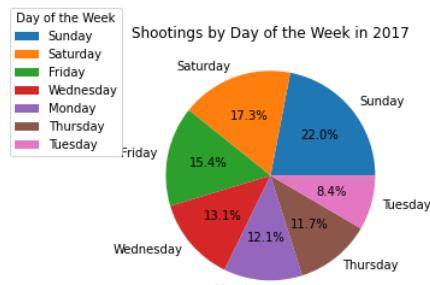
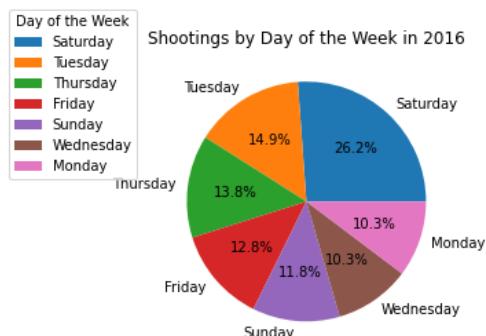
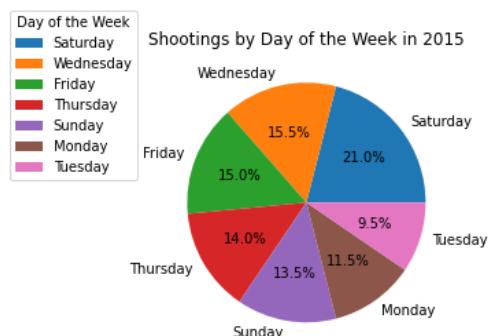
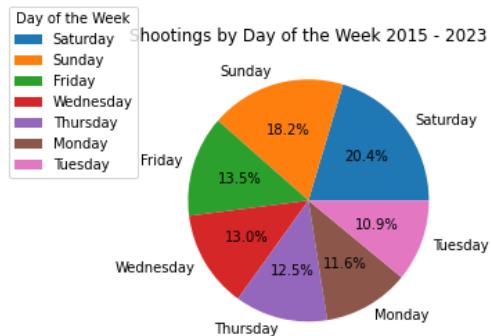
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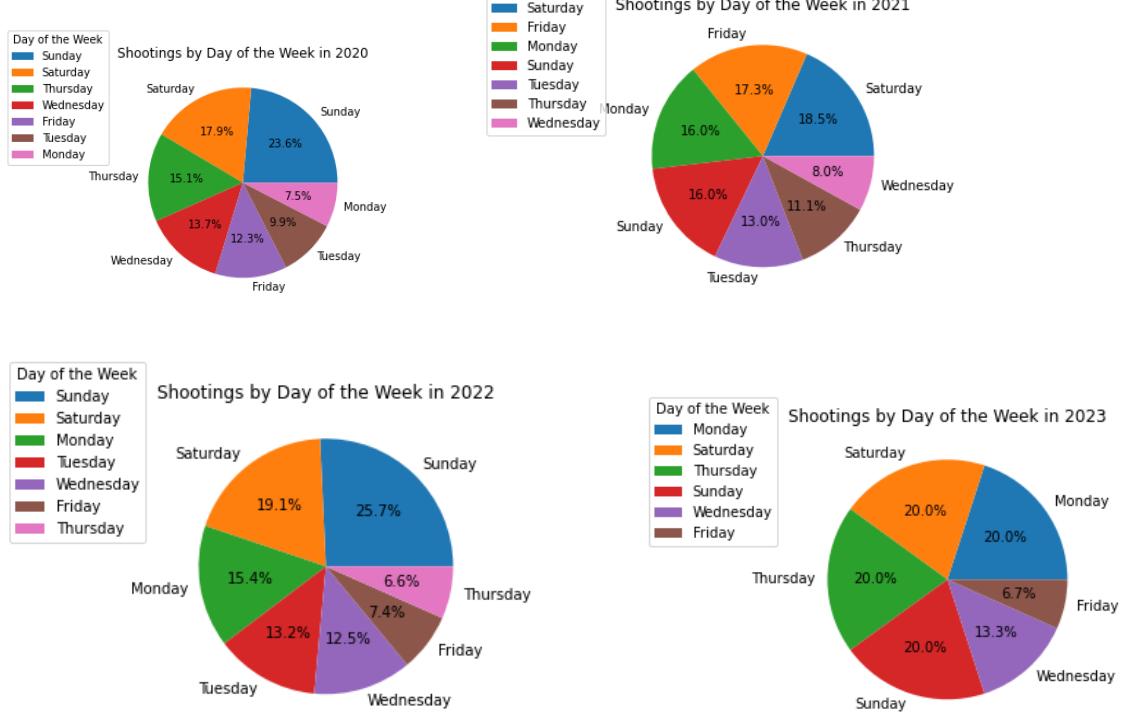
- [SHOOTINGS](#) data from 2015 - 2023

➤ Jupyter notebook file:

- File: [gun_violence_PatW.ipynb](#)
- Location: code / gun_violence_PatW.ipynb

➤ Key Graphs :

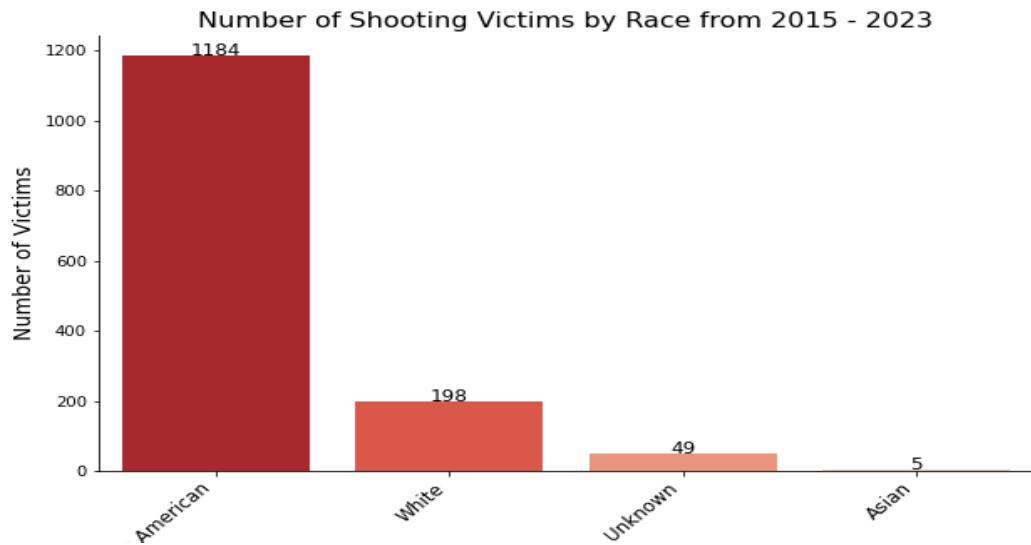




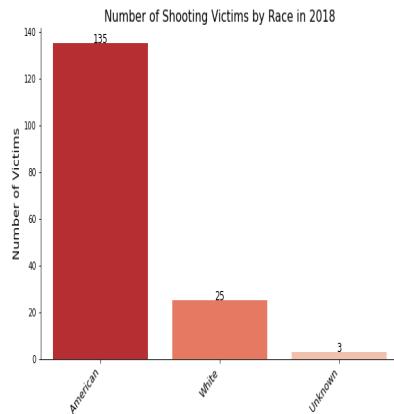
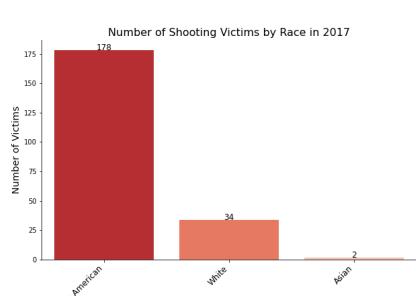
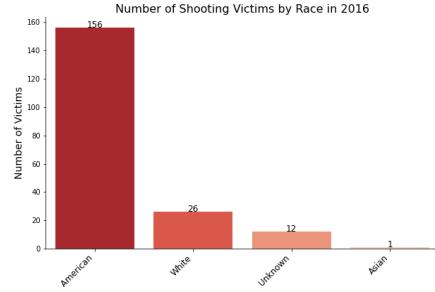
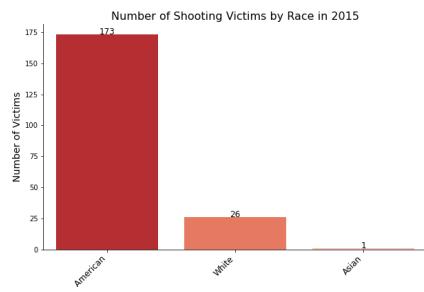
➤ Observations:

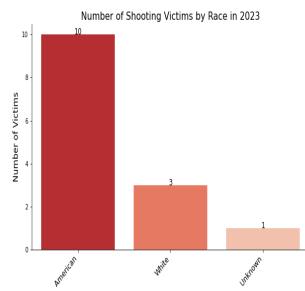
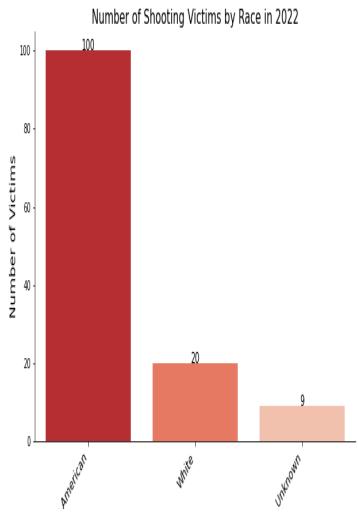
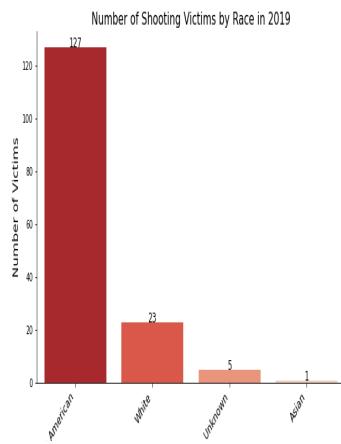
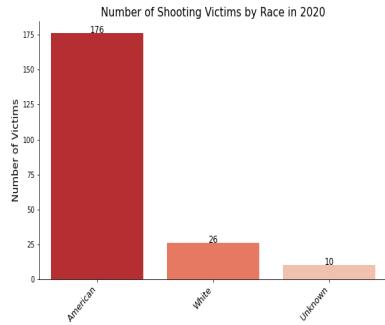
- Within D4, the days on which most shootings occur are:
 - **Saturday** - based upon the graphs Saturday shooting percentages are consistently higher than all other days, if Saturday is not the highest percentage then it is the second highest percentage in each year. However, there still was a slight dip in percentages after 2019 and I wonder if this is due to more police presence on Saturdays in D4.
 - **Sunday** - Sunday was the second highest percentage within our dataset. In 2017, Sunday had the highest percentage out of all the days, which was unique to the first 4 years of the dataset because in every year within that 4 year span, Saturday had the highest percentage over Sunday by a decent margin. But after 2018, there was a spike in shootings that occurred on Sundays within D4 excluding one of the years. Excluding 2023 due to limited data, Sunday had the highest percentage of shootings in 3 out of 4 years from 2019 - 2022. I wonder if this change has to do with the number of patrols or police presence within D4 or if there is another reason for this change in the data.
 - **Friday** - It seems like the rest of the days of the week all jumped around a little bit from year to year, but Friday was the third highest percentage within this span right next to Wednesday and Thursday. Monday and Tuesday not falling too far behind them either. Most of the shootings happen from Friday to Sunday: a little over 50% of shootings have happened from Friday to Sunday in our 9 years (2015 - 2023) of data covering shootings within D4. It might be best to increase the patrols within D4 during these days of the week.

➤ Additional Graph Data:



Questions Analyzed: Also looking at all the shootings that have taken place just within District 4, what is the number of shootings victims by race/ethnicity per year from 2015 - 2023? Lastly, using the same dataset as above, what is the number of shooting victims by gender per year from 2015 - 2023?

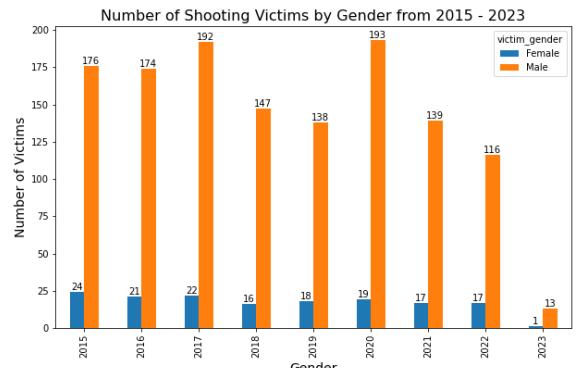
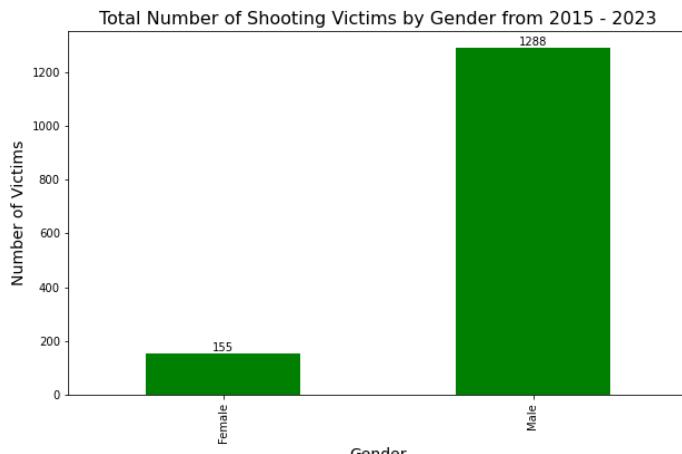




➤ Observations:

- Here I am using the same modified dataset as before that focuses on shootings that have occurred within D4 from 2015 - 2023. I am focusing on data that has more to do with the victims themselves
 - This data above shows the race of the victims within this time period, Black/African American victims are by far the highest compared to any other race.
 - Due to D4 being a predominantly black area this data makes sense, but hopefully there is a solution we can find to drastically decrease the number of black shootings within D4 as well as decrease the number of shootings within D4 as a whole.
 - The number of black victims is nearly 6x that of the next highest race/ethnicity of victims within D4.

➤ More graphs for Victim Data Analysis:



➤ Final Observations:

- This again reflects the victim data for D4 shootings.
 - This data as well comes as no surprise due to the fact that most of the shootings that happen within D4 are gang-related and most gang members, so I've been told, are male rather than female.
 - The number of male victims is over 8x that of the number of female victims within D4.
 - I believe to limit and disrupt gang activity within D4 would hopefully lead to fewer shootings within the district.

Extension Proposal:

To further enhance our project's insights and contribute to urban planning and community development recommendations, we aim to expand the scope of our project by incorporating Environmental/Community Factors. Specifically, we will focus on factors such as green space, tree canopy, community programming, interactions, and pedestrian/mobility data.

The inclusion of Environmental/Community Factors is essential as it acknowledges the significant role that the natural environment and community programming play in shaping the quality of life for residents. Access to green spaces promotes physical activity, mental health, and social cohesion within a community. Tree canopy data is essential for understanding the distribution and health of trees in urban areas, which can have numerous environmental and health benefits. Community programs can provide essential resources and services for residents, particularly in underserved areas. Analyzing interactions between different factors, such as routes from schools to public transit stops, can shed light on mobility patterns and potential barriers to accessing public transportation. Pedestrian and mobility data can provide insights into the safety and accessibility of walking and mobility options, which are essential for promoting active transportation and reducing reliance on cars. Our team plans to utilize data sets and sources such as green space and tree canopy data, community programming, pedestrian/mobility data, and more, to provide a more comprehensive analysis of the community's environmental health and well-being, as well as its impact on mobility and access to public transit. Through data analysis, visualizations, community engagement, and policy recommendations, the project can contribute to informed decision-making for urban planning and community development, promoting sustainability, equity, and well-being in the community.

Deliverable 3:

Extension Proposal:

Our project has analyzed victim data of District 4 shootings, including trends by race and gender, and identified decreasing trends in reported gun crimes. We have also analyzed field contacts data in Districts C11, B3, E13, B2 in D4, and conducted in-depth analyses of student discipline data.

We propose to expand our project to incorporate Environmental/Community Factors, specifically focusing on Green Space, Tree Canopy, Interactions, and Pedestrian/Mobility data. This expansion will provide a more comprehensive understanding of the community's environmental health, social dynamics, and mobility options, enhancing our insights and recommendations for urban planning and community development.

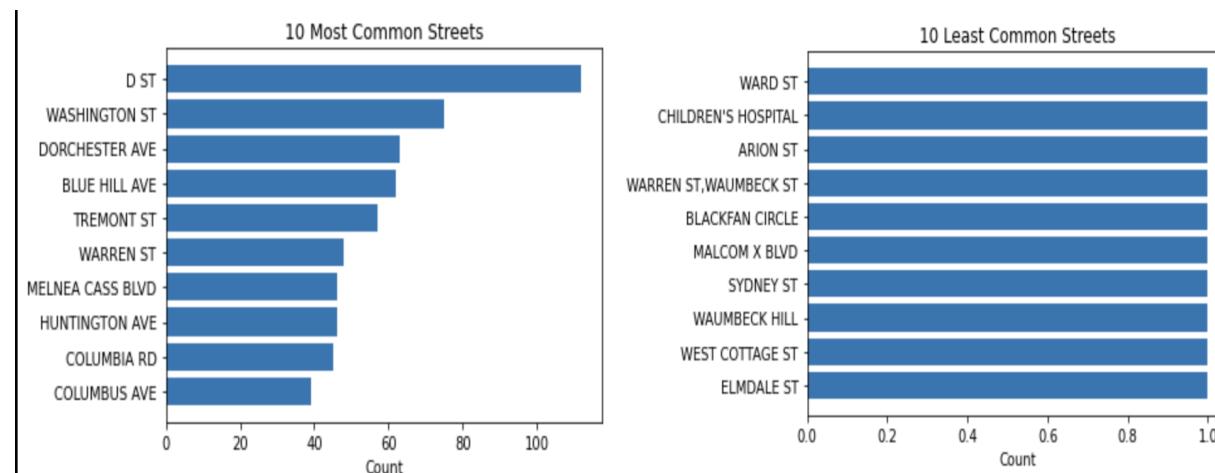
Individual Contributions and Observations:

Patrick Wright: U96180673

Data used: Boston Traffic Dataset/<https://data.boston.gov/dataset/traffic-related-data>

Files:

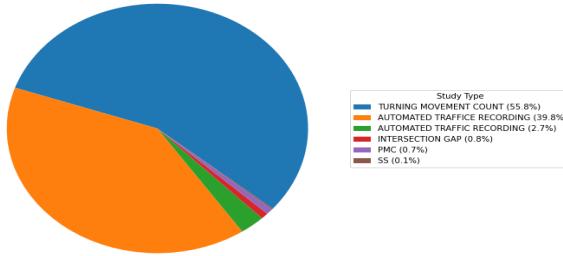
-/data/BTDTrafficData
-/deliverables/deliverables 3/code/[TransportationGV.ipynb](#)



Observations:

- We had slight trouble with the data
- We cut the data to focus solely on D4, however, after some research we found out that some of the streets were not found in D4.
- Keeping those ideas in mind, the graphs above show the top 10 most and least common streets that we found in the Traffic Dataset.

Percentage of Each Study Type



Observations:

The pie chart above shows the percentage of each study type in traffic data. The chart displays the most common study types and their corresponding percentage of the total count. The 'Turning Movement Count' study type is the most common type of study found within the dataset. These TMC counts are used for intersection analysis: traffic operation analysis, intersection design, transportation planning applications. From my understanding, these types in the traffic data refer to normal roads and intersections, which makes me wonder if shootings within district 4 are more likely to occur on streets where there are less bus stops and T stops due to there likely being less people. Again, I would need to gather more data in order to make a more accurate conclusion, but this is my thought process for the data at hand at the moment.

```

Study types for COLUMBUS AVE:
TURNING MOVEMENT COUNT    37
SS                          2
Name: Study Type, dtype: int64
Study types for COLUMBIA RD:
TURNING MOVEMENT COUNT    45
Name: Study Type, dtype: int64
Study types for HUNTINGTON AVE:
TURNING MOVEMENT COUNT    44
PMC                         2
Name: Study Type, dtype: int64
Study types for MELNEA CASS BLVD:
TURNING MOVEMENT COUNT    46
Name: Study Type, dtype: int64
Study types for WARREN ST:
TURNING MOVEMENT COUNT    48
Name: Study Type, dtype: int64
Study types for TREMONT ST:
TURNING MOVEMENT COUNT    57
Name: Study Type, dtype: int64
Study types for BLUE HILL AVE:
TURNING MOVEMENT COUNT    60
INTERSECTION GAP            2
Name: Study Type, dtype: int64
Study types for DORCHESTER AVE:
TURNING MOVEMENT COUNT    61
INTERSECTION GAP            2
Name: Study Type, dtype: int64
Study types for WASHINGTON ST:
TURNING MOVEMENT COUNT    75
Name: Study Type, dtype: int64
Study types for D ST:
TURNING MOVEMENT COUNT    106
INTERSECTION GAP            4
PMC                         2
Name: Study Type, dtype: int64

```

Further Data Collection and Analysis:

Here is some more data that I collected to further show that the 10 most common streets found within the data are of type 'TMC'.

With this information, I also looked at some of the information that Vaishnavi found by using her map. I compared what I found vs. what she found in order to reach a hypothetical solution. From here, I can take this hypothetical solution and continue to look into information that could make the conclusion more accurate.

As I mentioned above, I believe that this data shows us that shootings seem more likely to occur in places with less things going on. (All aspects: people, transportation, etc.

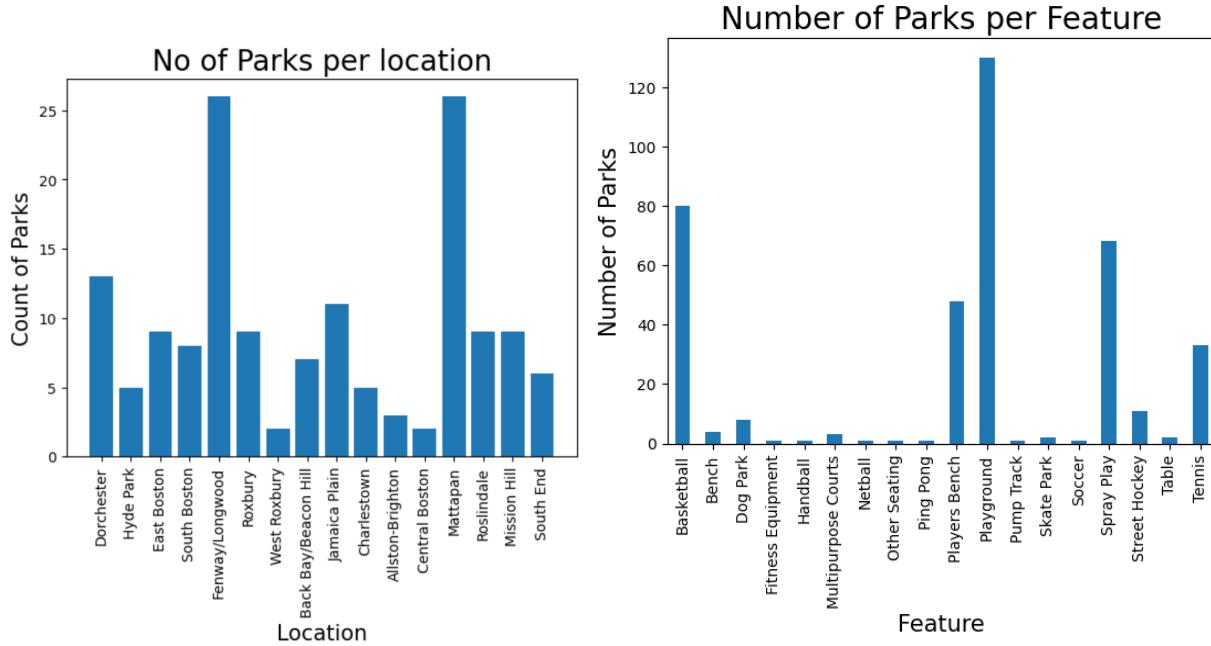
Snigdha Reddy Pulim:

Data used:

- [Parks](#)
- [Crime Incident Reports - Datasets - Analyze Boston](#)

Files:

- [../deliverables/deliverables 3/code/parks.ipynb](#)
- [../deliverables/deliverables 3/code/count_on_borders.ipynb](#)



Observations:

Top 5 neighbourhoods by count of Parks in the neighbourhood:

- Fenway/Longwood
- Mattapan
- Dorchester
- Jamaica Plain
- Roslindale; Mission Hill

Top 4 neighbourhoods by count of Parks in the neighbourhood in District 4:

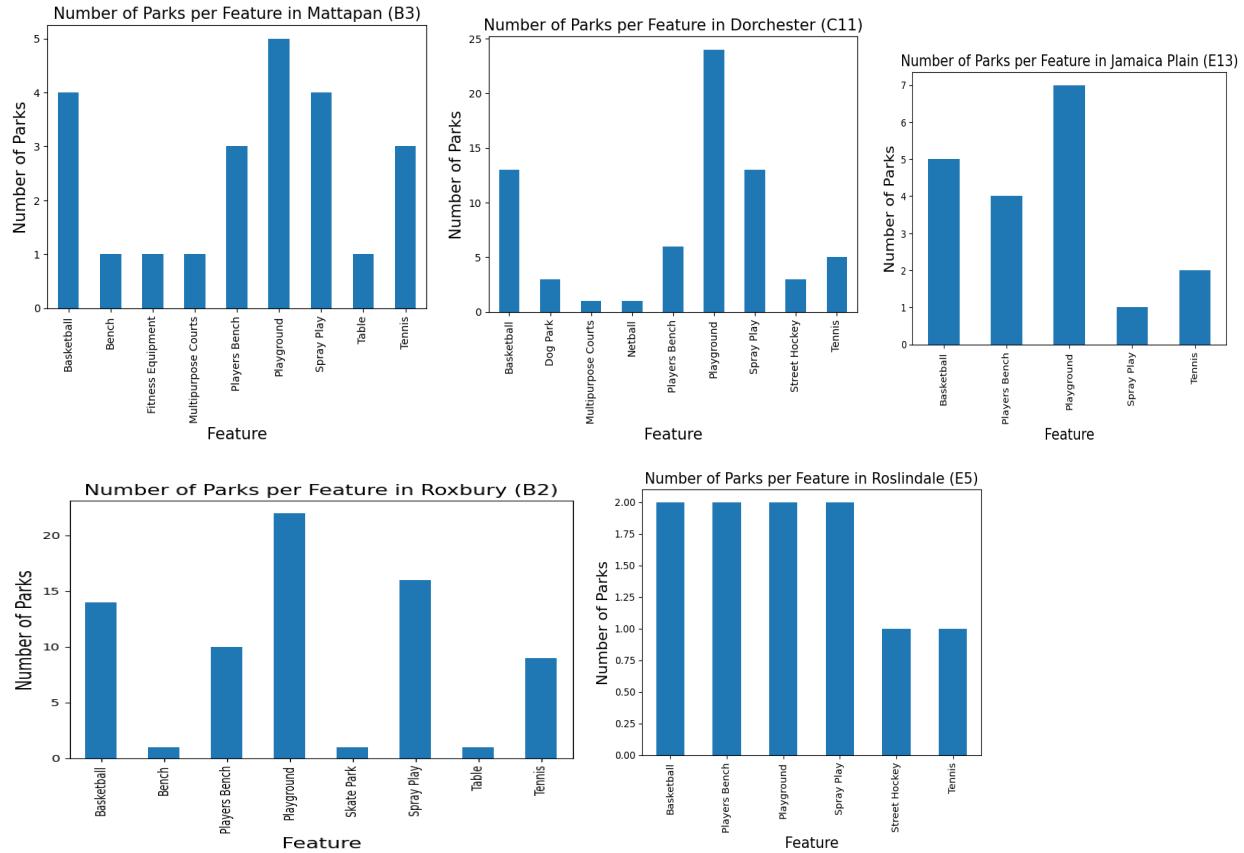
- Mattapan
- Dorchester
- Jamaica Plain
- Roslindale

Despite the high crime rate in District 4, it is interesting to note that the number of parks is also high, particularly in the top 4 neighborhoods listed above. This finding challenges the assumption that more parks necessarily lead to a reduction in crime.

From the plot, we can see that the top 5 features with the most parks are Playground, Basketball, Spray Play, Players Bench, and Tennis. This information can be useful for city planners and park management to understand the popular features among park visitors and make informed decisions on park upgrades and improvements.

Additionally, we can see that there are some features with very few parks, such as Boathouse and Ice Skating, which may indicate opportunities for further development in those areas.

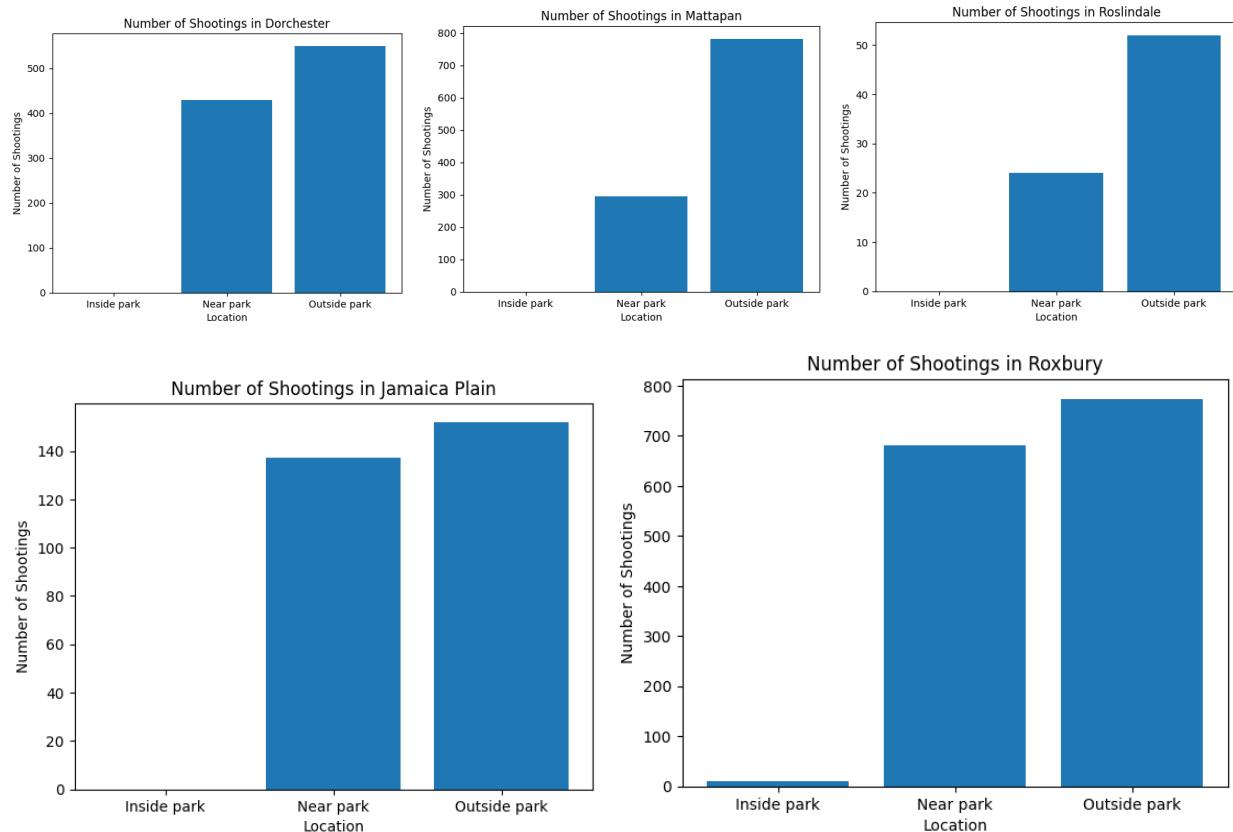
Overall, this analysis provides insights into the distribution of park features and can aid in decision-making for park management and planning.



Observations:

The plots reveal that different features are more prevalent in some locations than others. For example, in Dorchester and Roxbury, playgrounds are the most common feature in parks, while in Roslindale, basketball courts and baseball fields are more common. In Jamaica Plain, trails and paths are the most common feature in parks, and in Mattapan, spray pools and water play areas are more common.

Overall, the code provides useful insights into the distribution of park features in different areas of Boston, which can be helpful for city planners, community organizations, and residents who are interested in improving and maintaining their local parks.



Observations:

The given code analyzes crime data from 2015-2023 in several police districts in terms of shootings occurring inside, near, or outside parks. The code uses the Google Maps API to create polygons representing park boundaries and then determines whether a shooting occurred within a park or within 0.5 miles of a park.

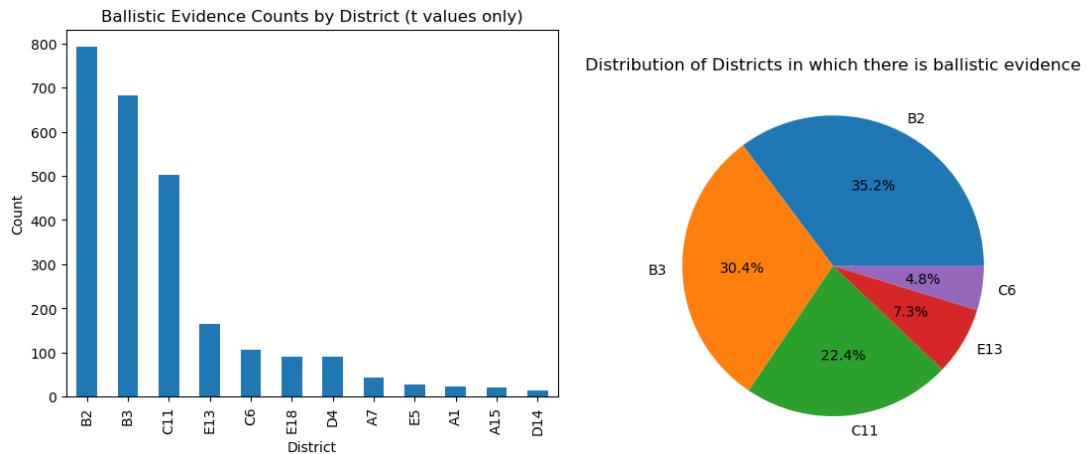
The analysis reveals that, for the most part, there are few incidents of shootings occurring inside parks. However, in Roxbury, there were approximately 20 such cases. More concerning is that a high percentage of shootings occurred within 0.5 miles of a park, although this rate varies across the districts.

It is worth noting that the differences in the number of parks and their density in each district could contribute to the variation in the number of incidents occurring within or near parks.

Tarek Mourad:

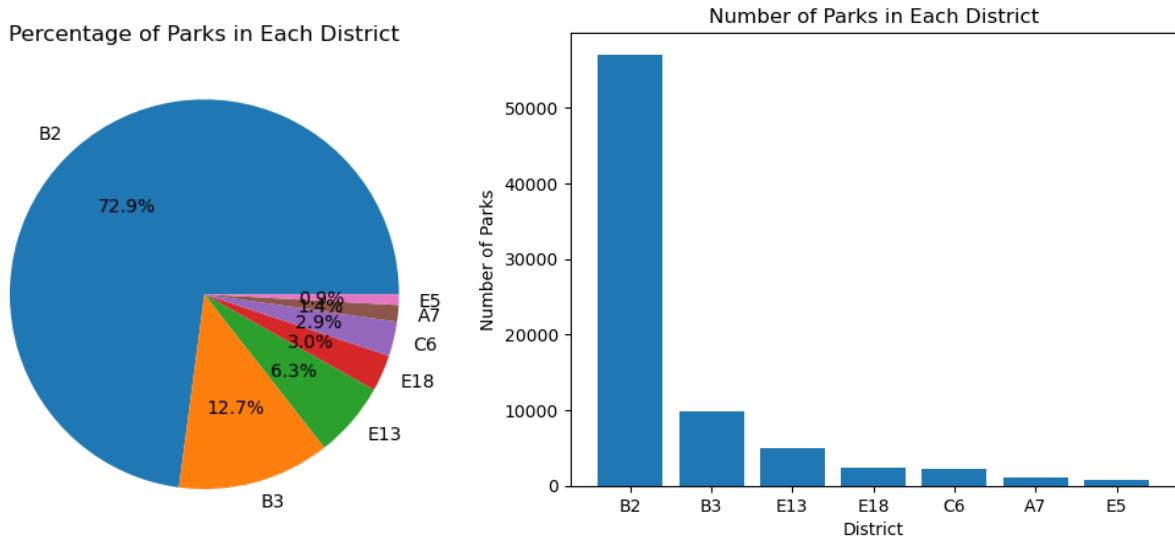
Data used: [tmp_97z79tt.csv](#), [tmpvyq0sbvq.csv](#)

Files: [..//deliverables/deliverables 3/code/gv2.ipynb](#)



Observations:

Districts B2, B3, and C11 have the highest counts of ballistic evidence.



Observations:

Districts B2, B3, and E13 have the highest number of parks. Keep in mind district B2 contains Franklin Park, which is one of the biggest parks in Boston. District B2 has the highest count of parks and ballistic evidence and 4 out of the 5 districts with the highest counts of ballistic evidence are within the top 5 districts with the highest counts of parks.

Conclusion:

To conclude, there is a correlation between the number of parks and the number of shootings. The higher the number of parks within a district, the higher the number of shootings within that district.

Why so?

Hypothetical situations:

- Drug deals in parks, fights, wide/open spaces could cause shootings.

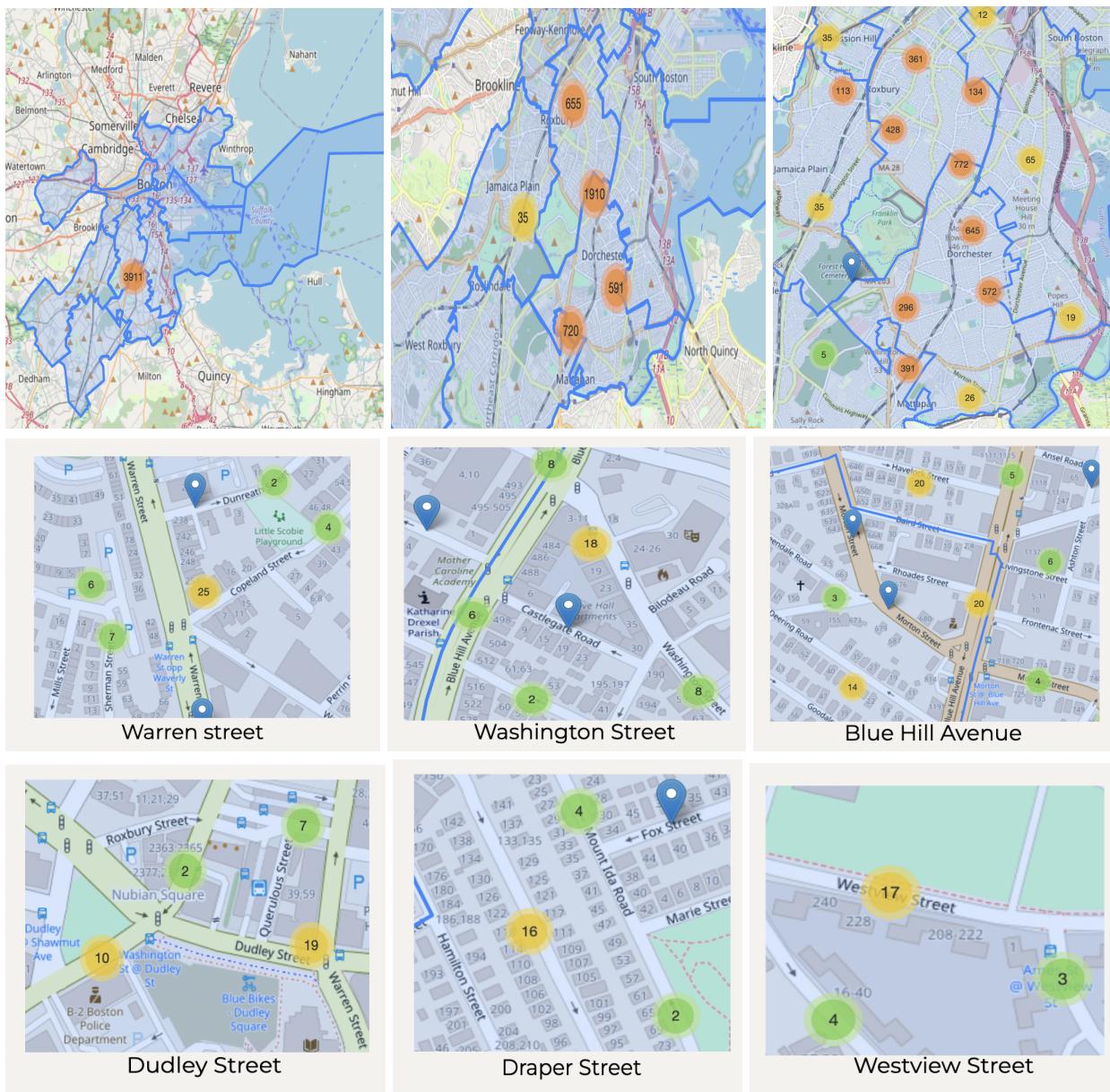
Vaishnavi Vadlamudi:

Data used: [Crime Incident Reports - Datasets - Analyze Boston](#), [Transit stops](#)

Files:

-/deliverables/deliverables 3/code/[CrimeIncidentReport_AllYears_Vaishnavi.ipynb](#)
-/deliverables/deliverables 3/code/[ReadingShapeFiles.ipynb](#)

Data visualization:



Observations part 1:

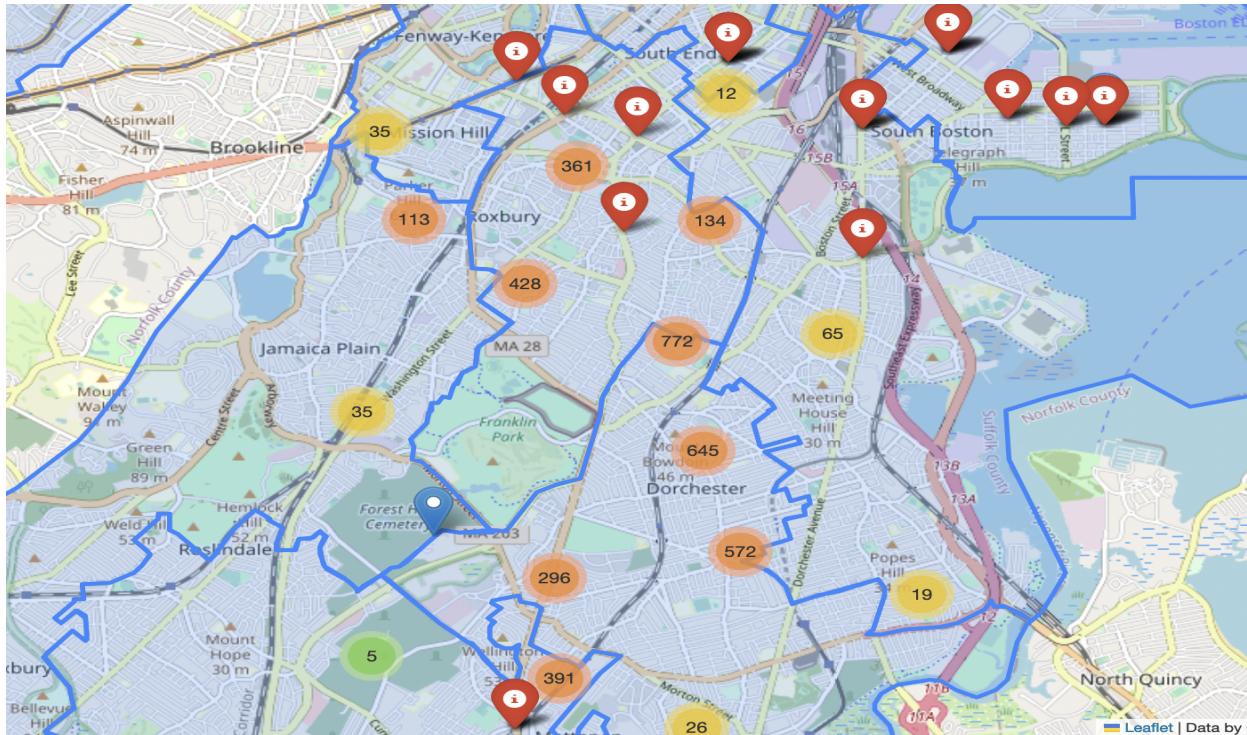
The above maps show the gun crime reports in a folium map, highlighting the streets with higher gun crime report incidents. Among these streets, Warren Street, Washington Street, Blue Hill Avenue, Dudley

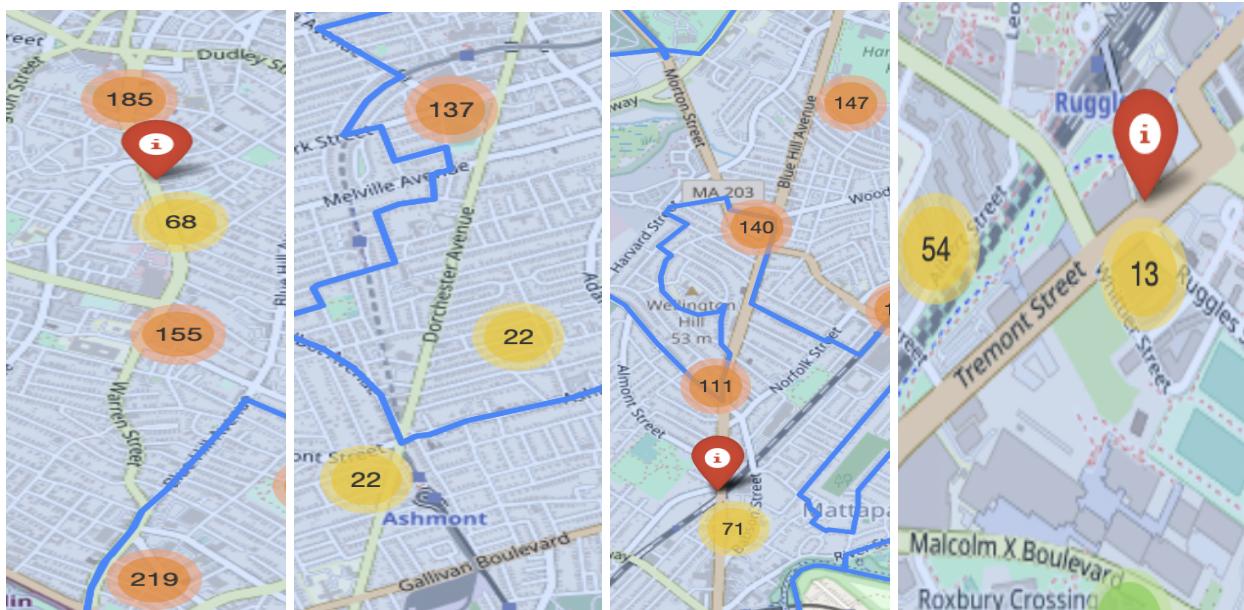
Street, Draper Street, and Westview Street stand out as areas with a high incidence of gun violence. Analysis of the crime reports reveals that the gun crime reports are noticeably higher than 15 in just one street over the past 7 years.

These findings are significant and have informed policies to increase police presence in these areas from 10 pm to 12 am, where the gun crime has been observed to be the highest. This information is presented in the Hourly Analysis section of the Deliverable 2 Report. The increased police presence is part of a broader effort to reduce the incidence of gun violence in the affected neighborhoods.

This was the basis for the next part of the data visualization.

Data Visualization Part 2:





Observations Part 2:

Furthermore, the analysis of the gun crime reports and the identification of the high-risk areas have led to additional visualizations of the data. For instance, we have created heat maps to provide a more comprehensive view of the prevalence of gun violence across the city. By visualizing the hotspots of gun violence, we can identify areas where intervention is most urgently needed.

In addition to the heat maps, we have also looked at the relationship between public transportation and gun violence.

Key Insights - Our analysis has shown that the streets with the highest number of public transportation stops are also the areas with the highest crime incidents. This finding is significant because it suggests that public transportation may be a contributing factor to gun violence in these areas.

Overall, the data visualizations have provided valuable insights into the prevalence of gun violence in Boston and have informed policies to reduce the incidence of crime in the affected neighborhoods. The next step in our analysis is to look at other factors that may be contributing to gun violence in these areas, such as socioeconomic factors and access to mental health services.

Furthermore, to check how the gun crime was throughout the 7 years on the day of our presentation which was also our teammate Tarek's birthday, I have done the following analysis:

On Tarek's birthday(Our Teammate), previous years:

376581	2019-04-14 01:23:00+00:00		376581	B3
376606	2019-04-14 03:05:00+00:00		376606	C11
376609	2019-04-14 04:16:00+00:00		376609	B3
376647	2019-04-14 10:03:00+00:00		376647	B3
460229	2020-04-14 20:18:00+00:00		460229	B3
529614	2021-04-14 08:27:00+00:00		529614	C11
529704	2021-04-14 16:21:00+00:00		529704	B3
529735	2021-04-14 18:34:00+00:00		529735	C11
529738	2021-04-14 18:45:00+00:00		529738	C11
602860	2022-04-14 12:37:00+00:00		602860	B2
602981	2022-04-14 22:20:00+00:00		602981	B3

This led to the following conclusion:

On this day every year, we have observed a total of 11 crime incident reports. The majority of these reports were filed in police districts B3 and C11. However, there has been a decreasing trend in the number of incidents reported in the past year. With this trend in mind, we hope that this year's crime incident reports will be minimal.

Conclusion:

This project aimed to analyze the drivers of gun violence in Boston's District 4, considering multiple datasets and community/environmental factors. The findings suggest that the location and type of violence can be identified by analyzing police records, discipline records from schools, and community/environmental factors. The incorporation of environmental/community factors, such as green space, tree canopy, community programming, interactions, and pedestrian/mobility data, provided a more comprehensive analysis of the community's environmental health and well-being and its impact on mobility and access to public transit.

Furthermore, the correlation between the number of parks and the number of shootings indicates that the higher the number of parks within a district, the higher the number of shootings within that district. It highlights the importance of designing public spaces to promote safety and well-being.

Analyzing the trends of reported gun crime, we observed that the year-on-year growth rate has been decreasing over the past few years. Though there are some irregularities due to the COVID-19 pandemic, the data suggests that the trend has been slowing down, and the numbers are not growing as quickly as they have in the past.

District D4 had a significantly higher number of field contacts compared to other districts, which increased by almost 100% since 2017. District E13 had a decrease in field contacts from around 20% to 11%. The months with the highest counts of field contacts were in the spring/summertime. The findings can inform policies that would involve higher police presence in the areas where the gun crime has been observed the highest.

Finally, the analysis of community/environmental factors and trends in reported gun crime emphasizes the importance of promoting sustainability, equity, and well-being in the community. The average counts for all months being around 4200, it is crucial to continue monitoring the situation and implementing measures to ensure public safety.