Gun Violence

Spring 2023 CS506 Data Science

Team 5

Team members :

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Introduction

project goal & overview
Project Goal: The main objective of this project is to delve into the factors contributing to gun violence in Boston's District 4 and draw comparisons with the rest of the city. The analysis will cover various aspects, such as police presence, poverty, population movements, and existing programs, with the ultimate aim of informing policies that can enhance the district and mitigate gun violence, especially among young individuals.

Project Overview: Initially, the project will concentrate on District 4 before broadening its scope to encompass the entire city of Boston. we will employ an array of data sources and conduct in-depth analyses to gain insight into the prevalence of gun violence in District 4 and juxtapose the findings with other areas in Boston. This approach will enable us to identify patterns and relationships between different variables, thereby assisting Councilor Worrell and other policymakers in making well-informed decisions to improve District 4 and address gun violence in the city. The project will involve examining police records, school discipline records, and community factors to identify patterns and relationships between different variables. Additionally, we will explore creative extensions to incorporate other relevant data sets to better understand the context of gun violence in the community. Ultimately, the findings from this project will help Councilor Worrell and other policymakers make informed decisions for improving District 4 and addressing gun violence in the city.

The big picture/impact

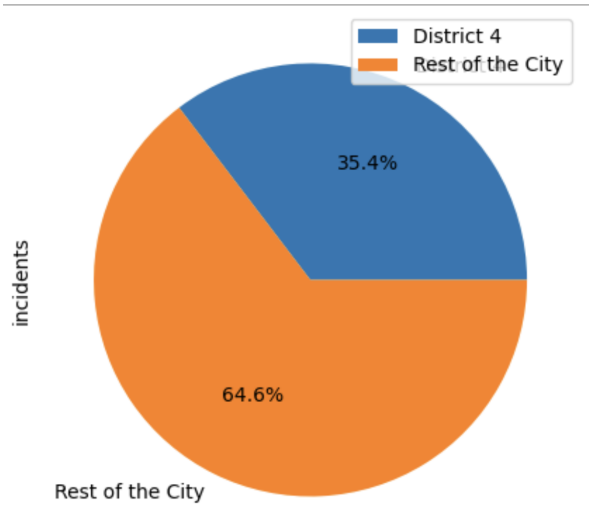
The insights derived from this project will enable Councilor Worrell, other policymakers, and stakeholders to devise focused and efficient approaches to tackle gun violence. By addressing the fundamental drivers of this issue, the proposed interventions are expected to foster safer communities, enhance social conditions, and improve the overall quality of life for residents in District 4 and throughout Boston.

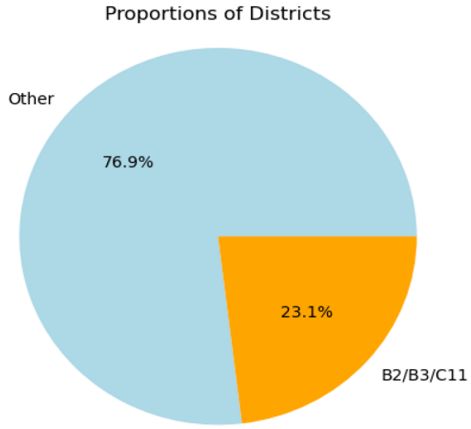
In the long term, the impact of this project may transcend the local community, as its findings and policy suggestions could serve as a blueprint for other cities and districts grappling with similar challenges. The project's methodology in analyzing and addressing gun violence stands to

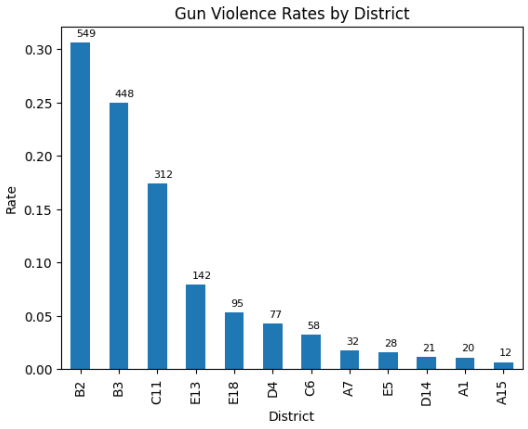
enrich the wider discourse on violence prevention and community development, spurring additional research and initiatives in the field.

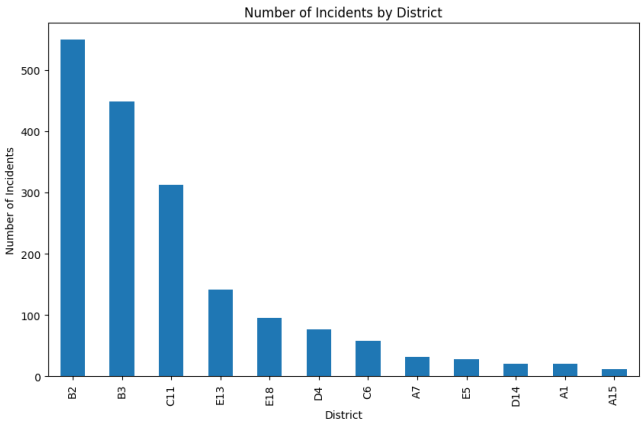
Base Analysis

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



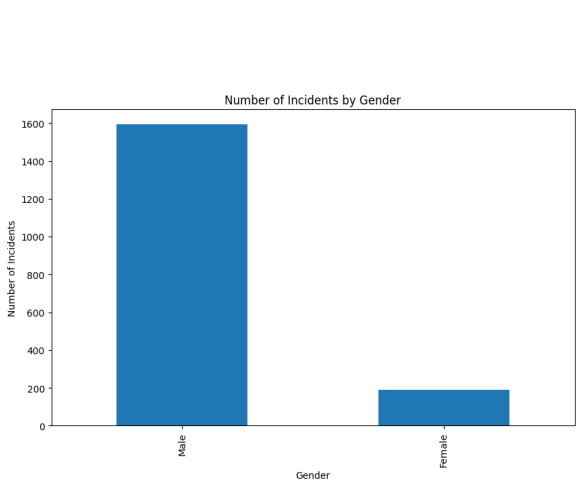


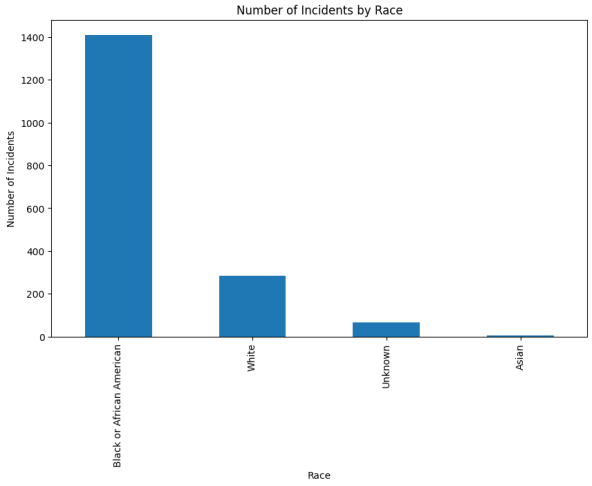


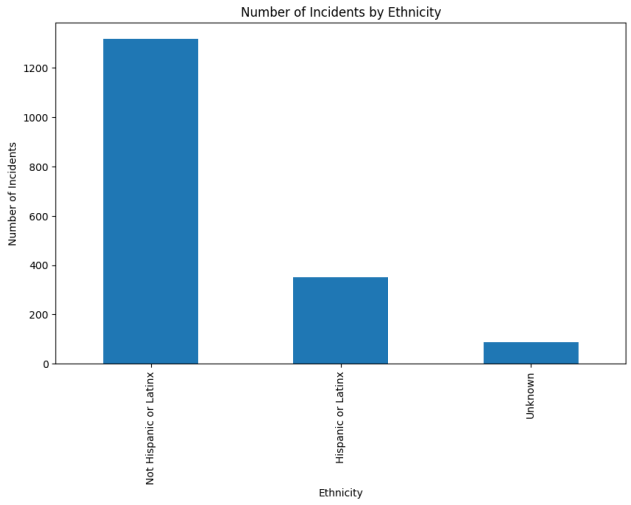


Given those graphs, we can see that B2, B3, and C11 in total are in charge of 23.1% of total shooting events in the Boston area. If we specify District 4, the proportion is even higher, that adds up to 35.4%. Given that District 4 by no means adds up to the area or population of 35% of Boston, we can see this incident percentage is really severe.

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







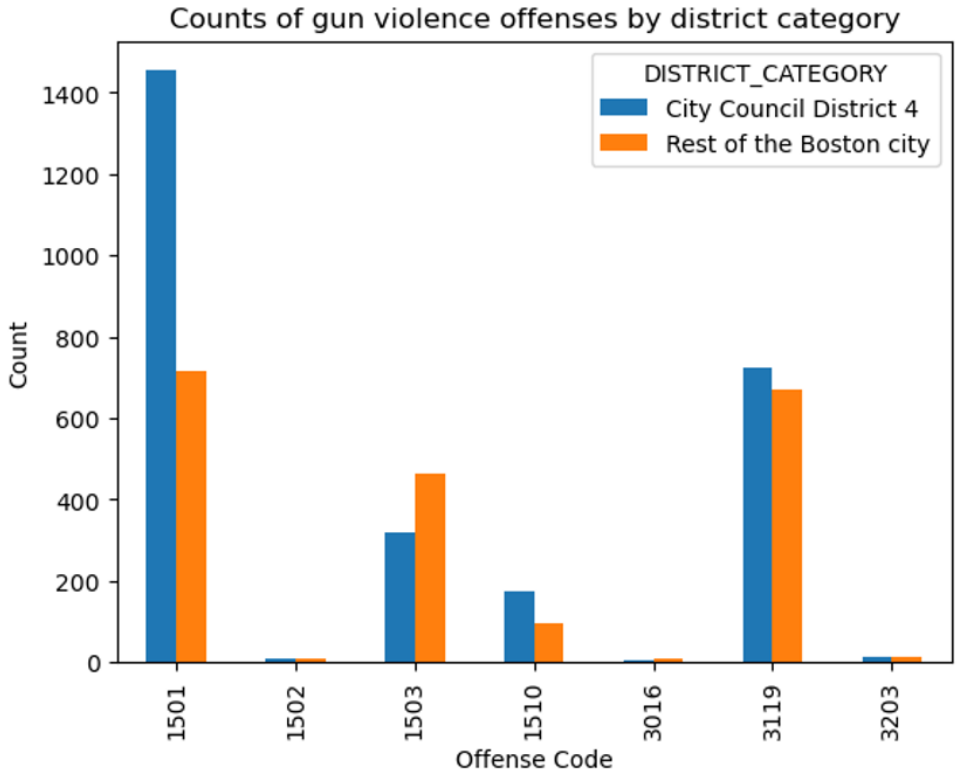
Here is the demographic report of the number of incidents by gender/race/ethnicity. We can see that in most cases, males are involved in gun violence. Also, in terms of race, black or African American are involved in the most gun violence, and in terms of ethnicity, Hispanic or Latinx are highly involved in gun violence.

Regarding the higher involvement of males in gun violence, this could be due to various societal and cultural factors. For example, there may be societal expectations or norms. Additionally, males may also be more likely to have access to firearms due to their participation in activities such as hunting or sport shooting.

Secondly, with respect to the higher involvement of black or African American individuals in gun violence, there are several potential contributing factors. One major factor is the persistent and systemic racism that black Americans face in various aspects of their lives, including in the criminal justice system.

Finally, the higher involvement of Hispanic or Latinx individuals in gun violence may also be related to social and economic factors.

In VISUALIZATIONS - 3.1,3.2,3.3 we have used combined Crime Incidents Reports Datasets from (2015-Present).



VISUALIZATION - 3.1

Counts of Gun Violence Offenses in District 4

3203: FIREARM/WEAPON - LOST (15)

1510: WEAPON - FIREARM - OTHER VIOLATION (175)

3016: FIREARM/WEAPON - ACCIDENTAL INJURY / DEATH (7)

3119: FIREARM/WEAPON - FOUND OR CONFISCATED (724)

1501: WEAPON - FIREARM - CARRYING / POSSESSING, ETC (1454)

1502: WEAPON - FIREARM - SALE / TRAFFICKING (8)

1503: WEAPON - OTHER - CARRYING / POSSESSING, ETC (318)

Counts of Gun Violence Offenses in Rest of the Boston

3203: FIREARM/WEAPON - LOST (15)

1510: WEAPON - FIREARM - OTHER VIOLATION (98)

3016: FIREARM/WEAPON - ACCIDENTAL INJURY / DEATH (11)

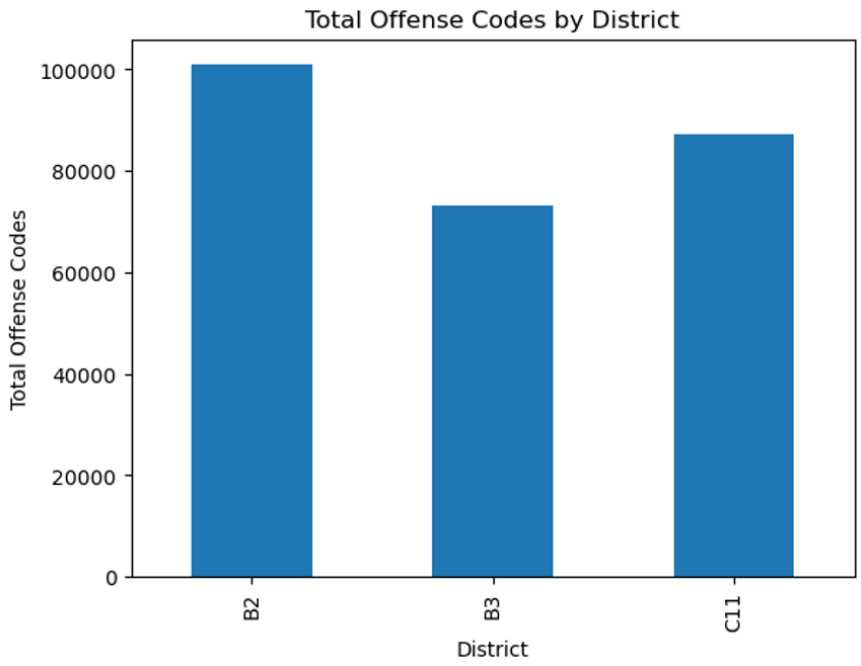
3119: FIREARM/WEAPON - FOUND OR CONFISCATED (701)

1501: WEAPON - FIREARM - CARRYING / POSSESSING, ETC (749)

1502: WEAPON - FIREARM - SALE / TRAFFICKING (8)

1503: WEAPON - OTHER - CARRYING / POSSESSING, ETC (476)

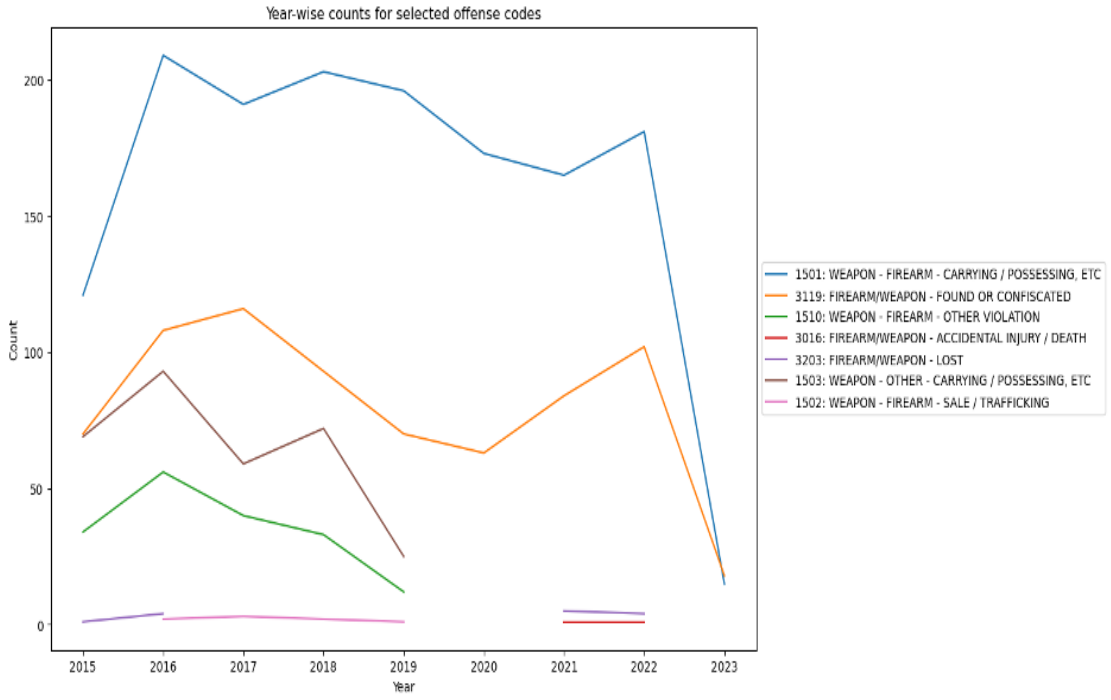
Description of the Visualisation:- Visualisation 3.1 presents a comparison between gun violence offenses in District 4 and the rest of Boston. The data has been filtered to include only gun violence-related offenses and includes a total of seven offense codes as shown above. The visualization shows the number of offenses for each code in both District 4 and the rest of Boston. District 4 has a higher number of gun violence offenses in most categories, with the exception of "WEAPON - FIREARM - OTHER VIOLATION," which has a higher count in the rest of Boston. The offense with the highest number of incidents in both District 4 and the rest of Boston is "WEAPON - FIREARM - CARRYING / POSSESSING, ETC," with 1454 and 749 incidents, respectively. This visualization helps to highlight the areas in which gun violence is most prevalent in Boston and can be used to inform targeted interventions and prevention efforts.



VISUALIZATION - 3.2

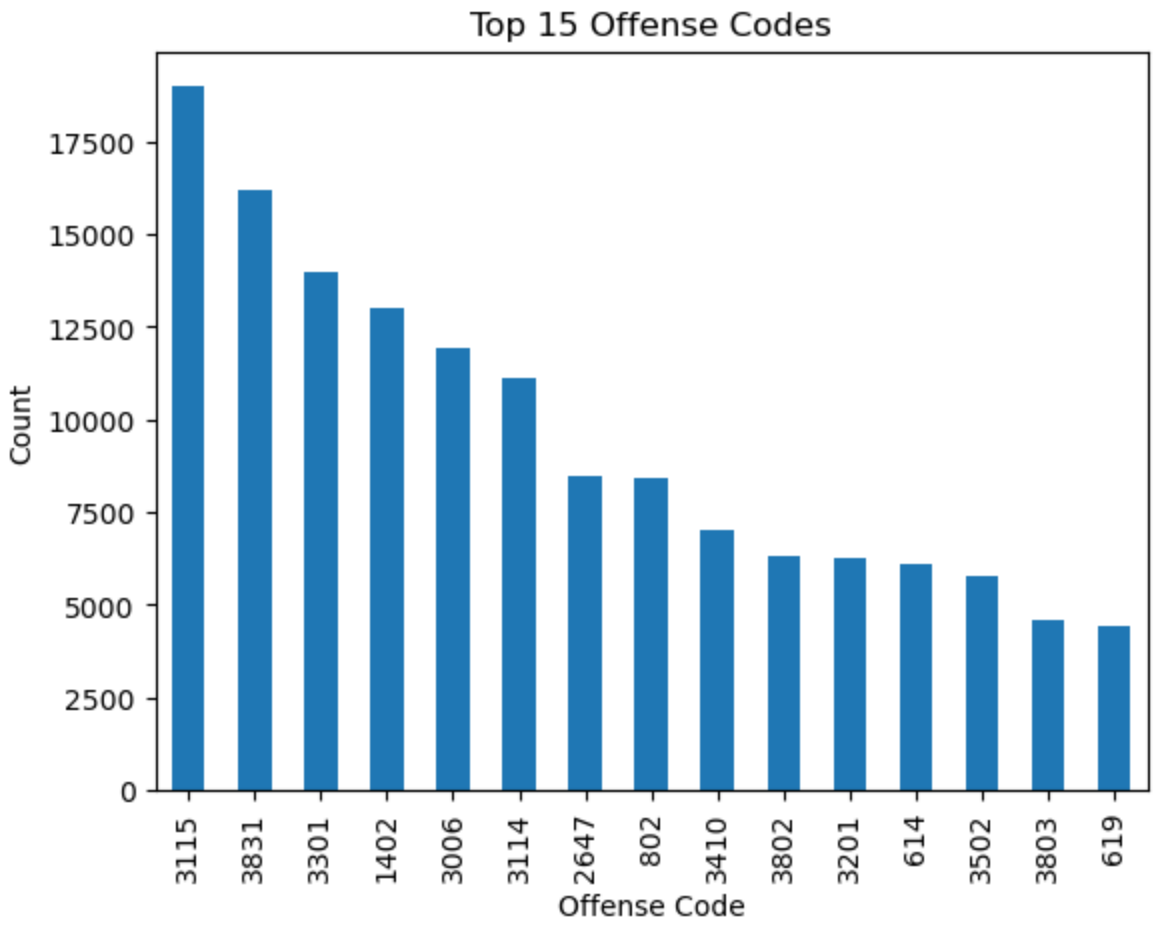
DISTRICT	TOTAL COUNT OF OFFENSES FROM (2015- PRESENT)
B2	100896
B3	73067
C11	87158

Description of the Visualisation:- Visualisation 3.2 presents the total count of offenses in three Boston police districts (B2, B3, and C11) from 2015 to the present. Unlike Visualisation 3.1, this visualization includes all crime incidents, not just those related to gun violence. The data shows that B2 (Roxbury) has the highest number of offenses with 100,896 incidents recorded, while B3 (Mattapan) has the least number of offenses with 73,067 incidents. C11 falls in the middle with 87,158 incidents. This visualization provides an overview of the crime situation in these three districts and can be used to inform resource allocation and policing strategies to address the areas with the highest crime rates.



VISUALIZATION - 3.3

Description of the Visualisation:-Visualisation 3.3 presents a year-wise count of gun violence-related offenses in District 2 in Boston. The data is filtered to include seven specific offense codes related to gun violence. Each code's count is presented on the y-axis, while the x-axis shows the year of the incident. The visualization provides a clear overview of the number of gun violence incidents recorded in each year for the seven offense codes in District 2. It can be used to identify trends and patterns in gun violence-related incidents in the district over time. Policymakers and law enforcement can use this information to allocate resources and design interventions to address the specific types of gun violence offenses that are most prevalent in the district.



VISUALIZATION - 3.4

Description of the Visualisation:-Visualization 3.4 presents a bar plot of the top 15 offense codes in District 4 in Boston based on the number of reported incidents. The visualization shows the count of incidents on the y-axis and the offense codes on the x-axis. The offense codes and their corresponding count of incidents are as follows:

3115: INVESTIGATE PERSON (18,978)

3831: M/V - LEAVING SCENE - PROPERTY DAMAGE (16,182)

3301: VERBAL DISPUTE (13,972)

1402: VANDALISM (12,984)

3006: SICK/INJURED/MEDICAL - PERSON (11,939)

3114: INVESTIGATE PROPERTY (11,123)

2647: THREATS TO DO BODILY HARM (8,491)

802: ASSAULT SIMPLE - BATTERY (8,397)

3410: TOWED MOTOR VEHICLE (7,025)

3802: M/V ACCIDENT - PROPERTY DAMAGE (6,326)

3201: PROPERTY - LOST (6,257)

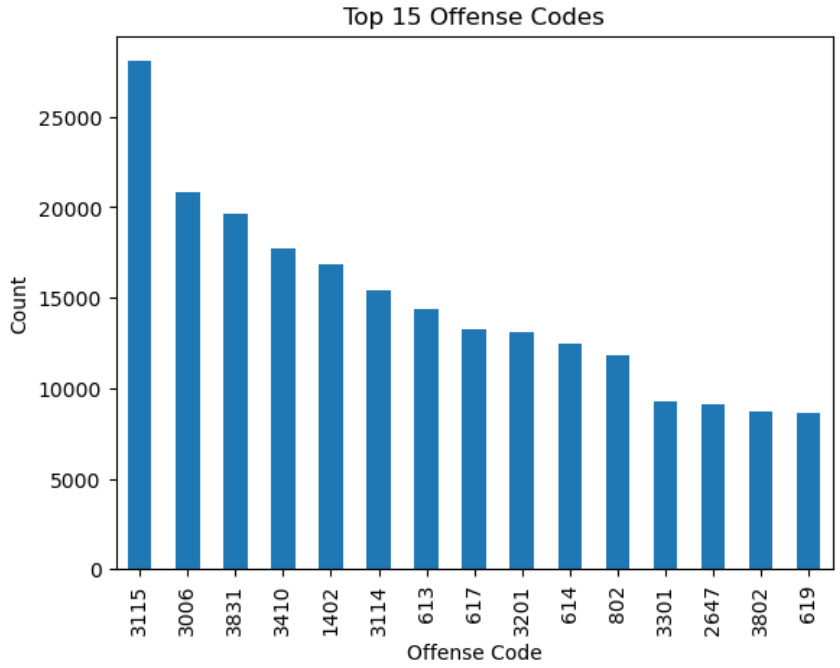
614: LARCENY THEFT FROM MV - NON-ACCESSORY (6,123)

3502: MISSING PERSON - LOCATED (5,760)

3803: M/V ACCIDENT - PERSONAL INJURY (4,605)

619: LARCENY ALL OTHERS (4,422)

The visualization provides an overview of the most common offenses in District 4 in Boston, with a focus on non-violent offenses such as investigating persons and property, leaving the scene of a motor vehicle accident, and property-related offenses such as theft and vandalism. The visualization highlights the importance of addressing these non-violent offenses in addition to violent crimes in efforts to improve public safety and quality of life in District 4.



VISUALIZATION - 3.3

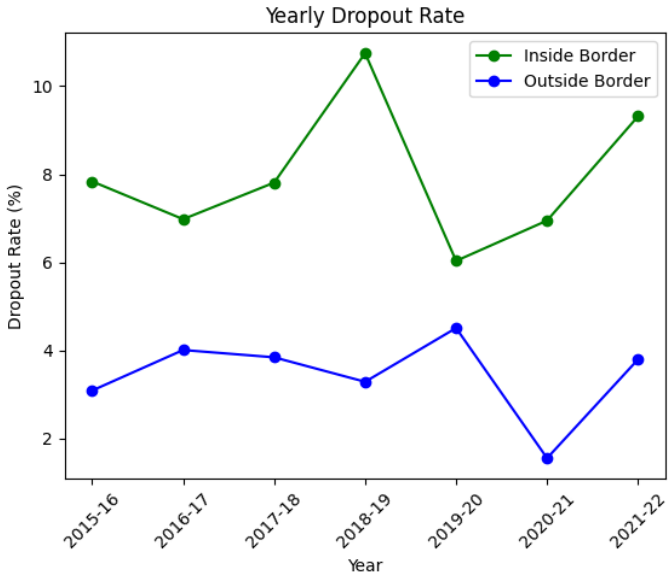
Description of the Visualisation:-

Visualization 3.5 presents a bar graph of the top 15 offense code counts for the rest of Boston, excluding City Council District 4. The counts and offense codes are as follows:

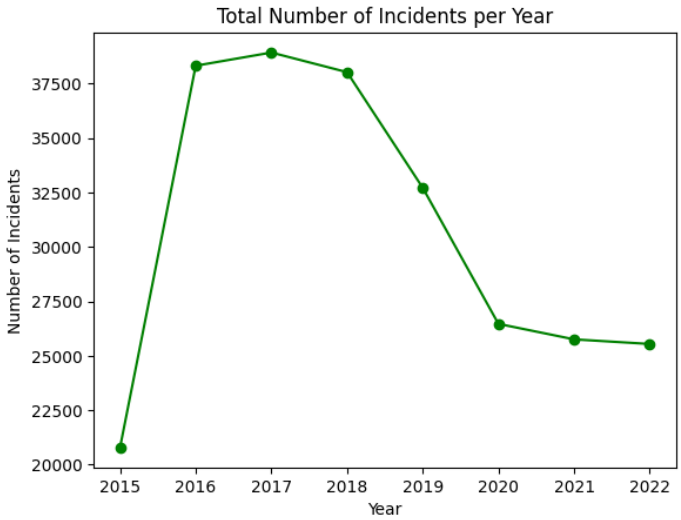
OFFENSE_CODE	COUNT	OFFENSE_DESCRIPTION
3115	28076	INVESTIGATE PERSON
3006	20853	SICK/INJURED/MEDICAL - PERSON
3831	19673	M/V - LEAVING SCENE - PROPERTY DAMAGE
3410	17732	TOWED MOTOR VEHICLE
1402	16829	VANDALISM
3114	15430	INVESTIGATE PROPERTY
613	14406	LARCENY SHOPLIFTING
617	13252	LARCENY THEFT FROM BUILDING
3201	13122	PROPERTY - LOST
614	12460	LARCENY THEFT FROM MV - NON-ACCESSORY
802	11814	ASSAULT SIMPLE - BATTERY
3301	9246	VERBAL DISPUTE
2647	9088	THREATS TO DO BODILY HARM
3802	8741	M/V ACCIDENT - PROPERTY DAMAGE
619	8656	LARCENY ALL OTHERS

Visualization 3.5 provides insights into the most common types of offenses occurring in Boston, outside of City Council District 4. The highest count is for "Investigate Person" offenses, followed by "Sick/Injured/Medical - Person" and "M/V - Leaving Scene - Property Damage." This visualization highlights the prevalence of different crime types in the area and can help policymakers, law enforcement, and community members better understand and address public safety concerns

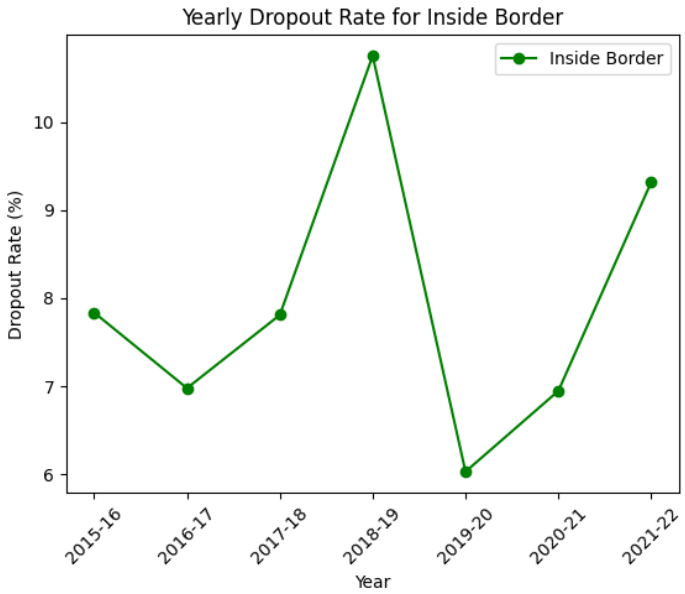
Extension Analysis



- The graph shows that the dropout rate has been consistently higher for schools outside the Boston border than for schools inside the border during the entire period from 2015-16 to 2021-22. The dropout rate for schools inside the border fluctuated between 2% and 4%, while the dropout rate for schools outside the border was between 4% and 10%.
- The trend for both groups appears to be stable, with only minor variations from year to year. It is worth noting that there is a sharp drop in the dropout rate for schools inside the border in 2019-20, which may be due to changes in school policies, external factors, or reporting methods.



- The plot provides an overview of the total number of incidents over the years and to show the trend in the count of incidents.
- The result obtained shows that the number of incidents was highest in the year 2017 and then there has been a subsequent decrement in the count of incidents till the year 2022.



- The plot shows the trend in yearly dropout rates for the Inside Border over time.
- Based on the graph, it appears that the dropout rate for the Inside Border increased over time, with a peak in the 2018-19 year and then decline in the years following.

The team contributed work

Yuhe Bian - Data processing, plot, and analysis for the number of incidents by Date, Year, and hour. Number of shootings per Month and Number of incidents by District and Shooting Type.

Peiying Ye - Data processing of separating District 4 and plotting that geographically. The analysis includes comparing that district with the rest of Boston in terms of shooting incidents sum, date, month, year, and period of time.

Hitanshi Jain - Data processing of crime reports dataset to find Top offense codes in District 4 and plotting year wise graphs. The analysis also include focussing only on Gun violence offenses in District 4 and comparing the results with the rest of city of Boston.

Sai Surya Varshith Nukala - I conducted an exploratory analysis on crime reports datasets to identify patterns of violence in District 4 compared to the rest of Boston, with a specific focus on gun violence. Additionally, I extended the analysis by creating a bar graph that displays the number of gun violence incidents within a one-mile radius of public places such as liquor stores, bus stops, open spaces(like parks, malls etc.), T-stops, etc. I also integrated school dropout datasets from 2007-2022 to compare the dropout rates in District 4 with the rest of Boston and analyze the correlation between the yearly dropout rate and the number of crime reports incidents in District 4.