



# **Boston Crime EDA**

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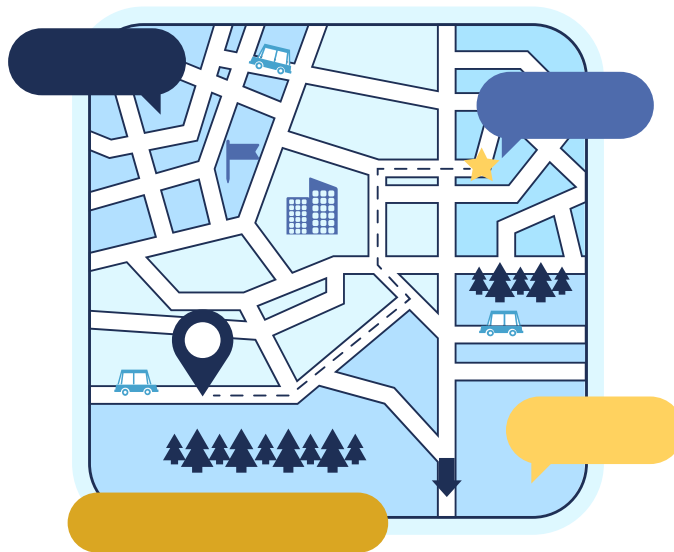
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# BACKGROUND



**Boston, officially the City of Boston, is the capital and most populous city of the Commonwealth of Massachusetts in the United States and 24th-most populous city in the country. The city proper covers about 48.4 sq mi with a population of 675,647 in 2020, also making it the most populous city in New England.**

**By being one of the populous city in the US and having a good database of crime that is accessible to public, We will try to analyze and gain insights from the database to be able to understand more about the crime, specifically in the city of Boston itself.**

# PROBLEM

## 1. Crime Rate Gap

Using the data from Federal Bureau of Investigation (FBI) and the Bureau of Justice Statistics (BJS), Pew Research Center have found that Americans tend to believe crime is up, even when the data shows it is down. In 20 of 24 Gallup surveys conducted since 1993, at least 60% of U.S. adults have said there is more crime nationally than there was the year before, despite the generally downward trend in national violent and property crime rates during most of that period.

Source: <https://www.pewresearch.org/fact-tank/2020/11/20/facts-about-crime-in-the-u-s/>



## 2. High Crime Rate

The crime rate in Boston is considerably higher than the national average across all communities in America from the largest to the smallest, although at 26 crimes per one thousand residents, it is not among the communities with the very highest crime rate. The chance of becoming a victim of either violent or property crime in Boston is 1 in 38. Based on FBI crime data, Boston is not one of the safest communities in America. Relative to Massachusetts, Boston has a crime rate that is higher than 98% of the state's cities and towns of all sizes

Source: <https://www.neighborhoodscout.com/ma/boston/crime#description>



# PROBLEM STATEMENT



1.

Is it true that the numbers of crimes is up each year?



2.

What can the government (Including the Police) do to reduce the crime numbers in Boston and make it safer for the citizen?



3.

What can the citizen of Boston do to help keep Boston safe?

# GOALS



1.

Finding the trends of crime number in general year over year.



2.

Recommend an action to be taken by the government to make Boston a lot safer.



3.

Giving recommendation for citizen of Boston to help reduce crime in their city

# DATA UNDERSTANDING

## COLUMNS

1. **Incident Number:** Unique number of each case (One case can contain multiple offences)
2. **Offense Code:** Code of Crime's Offense.
3. **Offense Code Group:** Name of the offense.
4. **Offense Description:** Description of the offense.
5. **District:** Boston District Code
6. **Reporting Area:** Area number where crimes occurred.
7. **Shooting:** Indicate if there are a shooting involves.
8. **Occurred On Date:** Date of the occurred crime
9. **Year:** Year of the occurred crimes.
10. **Month:** Month of the occurred crimes.
11. **Day of Week:** Day of the occurred crimes.
12. **Hour:** Hour of the occurred crimes.
13. **UCR Part:** Uniform Crime Reporting Offence types.
14. **Street:** Street name where crime occurred.
15. **Latitude:** The latitude where the crime happened.
16. **Long:** The longitude where the crime happened.
17. **Location:** Combination of Lat and Long (Lat, Long).

## BOSTON POLICE DEPARTEMENT DATABASE

## PROJECT LIMITATION

1. This project will use the database that is provided by Boston Police Department (BPD) from 2015-2021. But, the data from 2015 started only from June. So later we will drop all of the 2015 data.
2. The UCR PART columns data is only available until 2018. So later when we analyze the column, we will only analyzing the crime that occurs 2016-2018.
3. There are several Offense Code meaning that are not available on the BPD website. So later we will use the Offense Description column value for the Offense Code Group missing value.

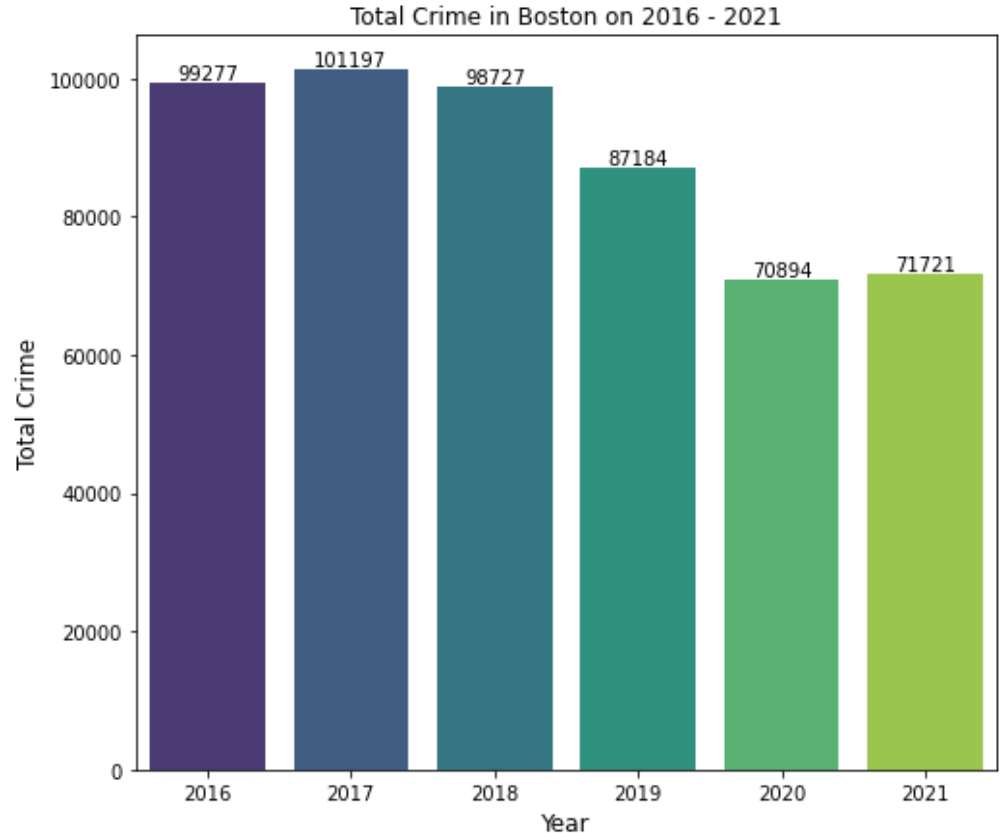
# INSIGHTS

## Question 1:

At what year that Boston is having the highest crime occurred?

## Insight:

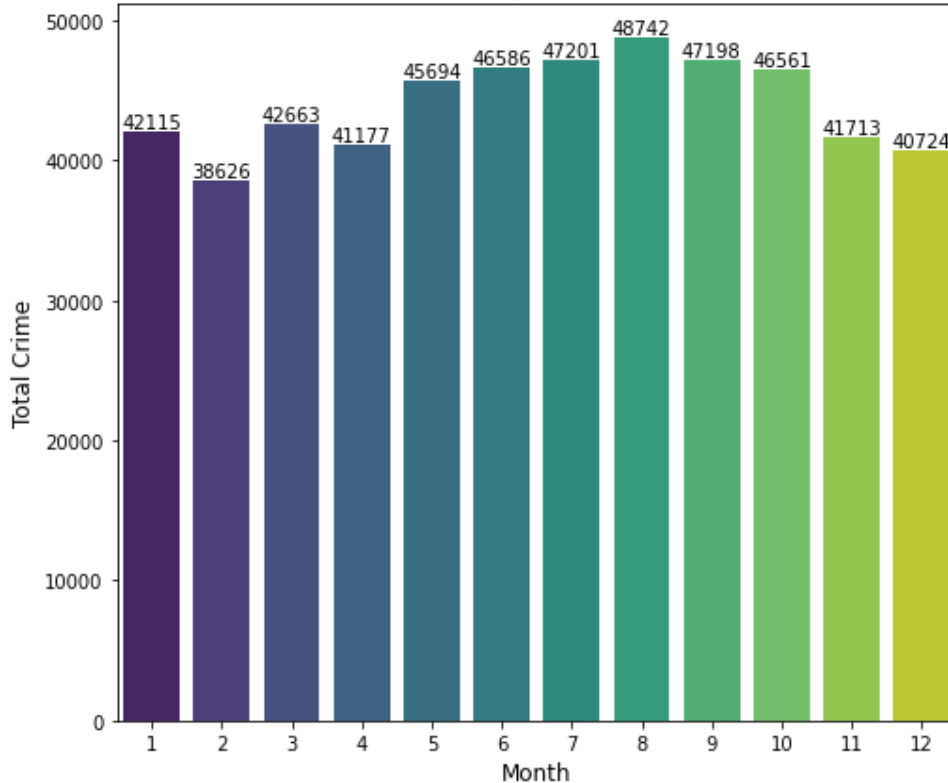
Crime in Boston hit its peak on 2017, and have been on the downtrend afterwards, and start rising again on 2021.





# INSIGHTS

Total Crime in Boston per Month on 2016 - 2021



## Question 2:

At what month that Boston is having the highest crime occurred?

## Insight:

From the bar chart, we can see that the crimes peaked on August.

# INSIGHTS

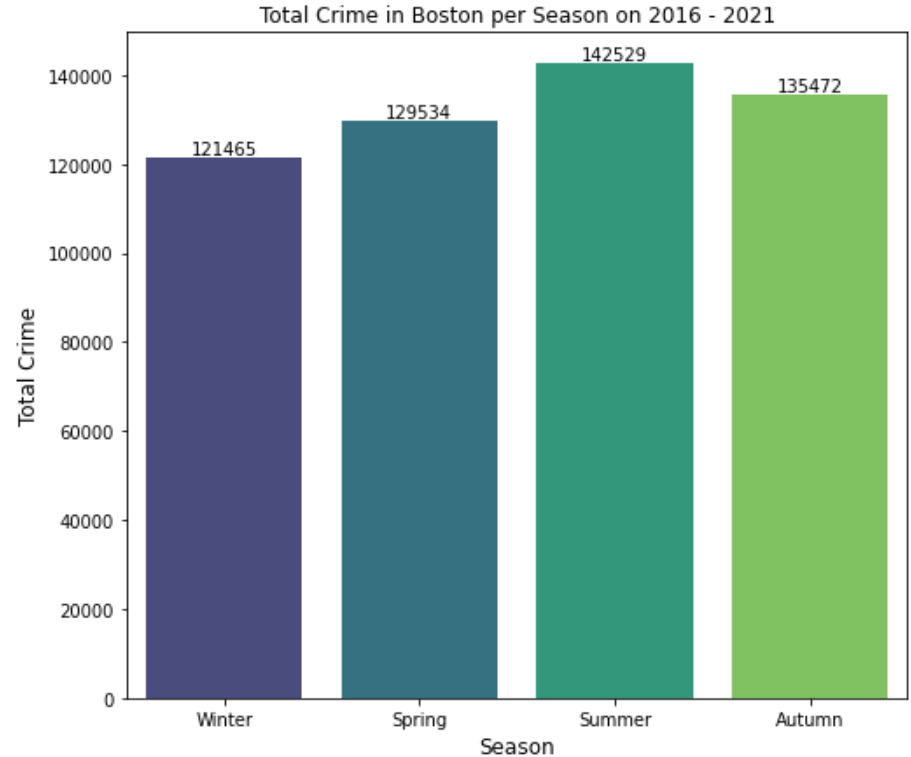
## Question 3:

What season most crime in Boston occurred on?

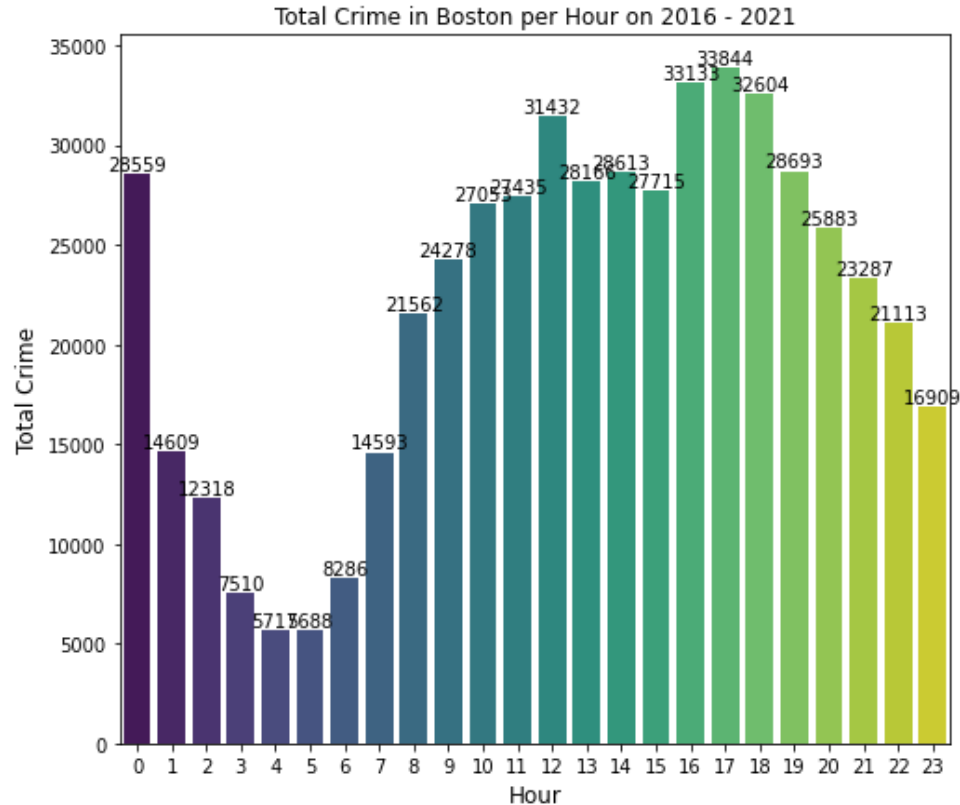
## Insight:

1. Now we can see more clearly that crime in Boston is rising and peaked until summer and start to goes down on Autumn to Winter. And then it will start to rise again during spring until Summer.

2. June-November is the range of months that crimes most likely to occur in Boston.



# INSIGHTS



## Question 4:

At what hour does the crime in Boston oftenly occurred?

## Insight:

From the bar chart, it can be seen that most of the crimes occurred after 7 am until 11 pm and spiked suddenly on hour 0 (12 am).

# INSIGHTS

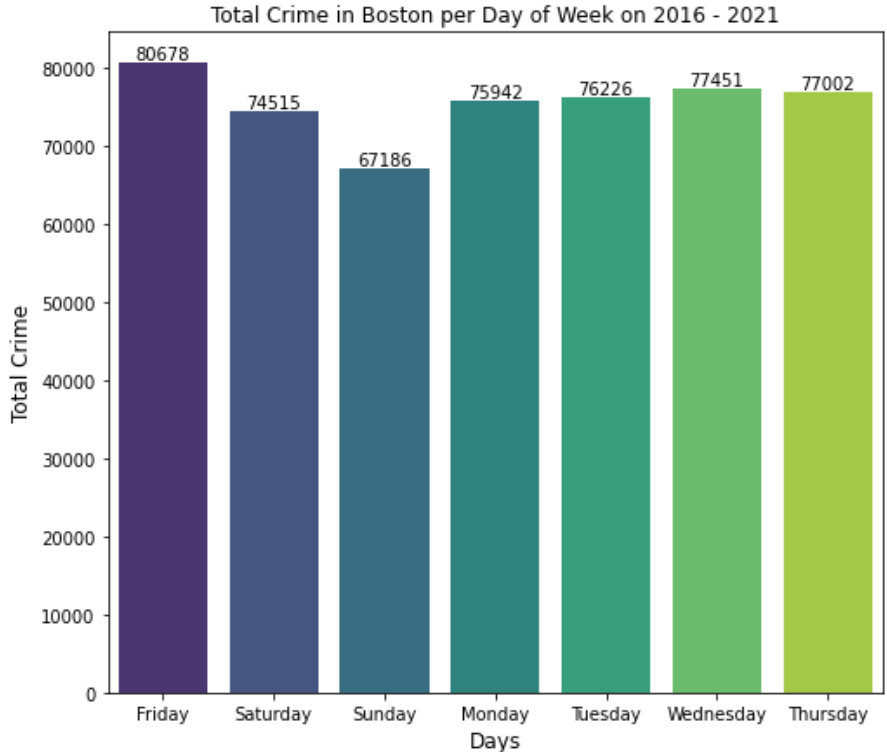
## Question 5:

On what day that crimes in Boston oftenly occurred?

## Insight:

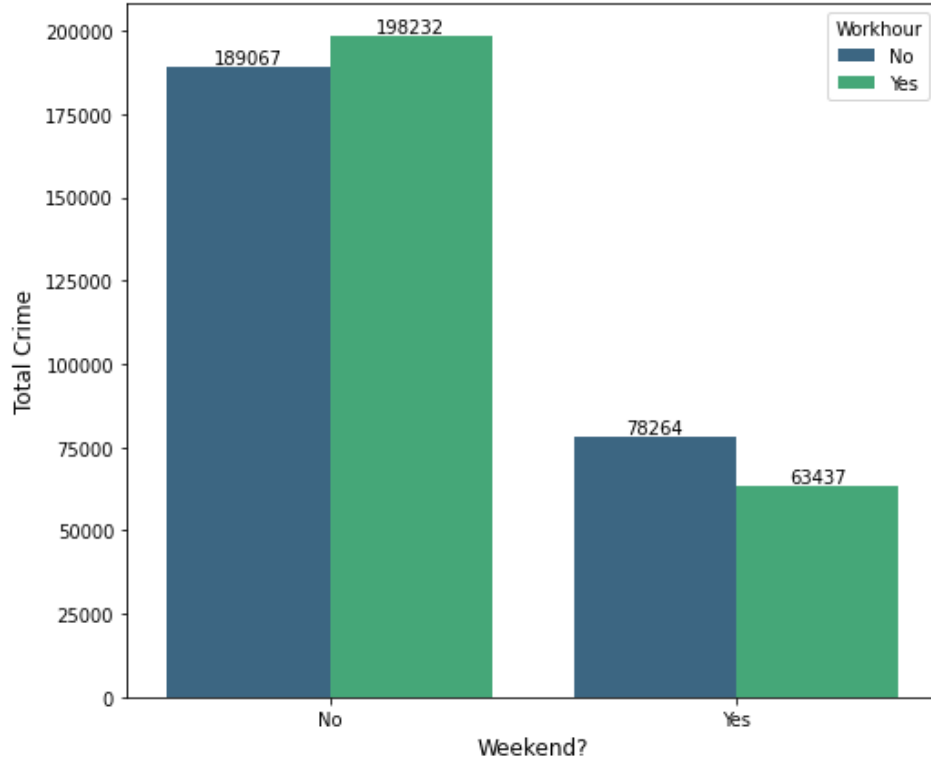
From the graph, it can be seen that the crimes are almost equally distributed throughout Monday-Saturday, and Sunday being the lowest day of crimes occurred, and Friday being the day for the most occurred crime.

Also, we can see that crime numbers is down on the weekend (Saturday and Sunday)



# INSIGHTS

Total Crime in Boston on Weekend/Weekdays and Workhour/non-Workhour from 2016 - 2021



## Question 6:

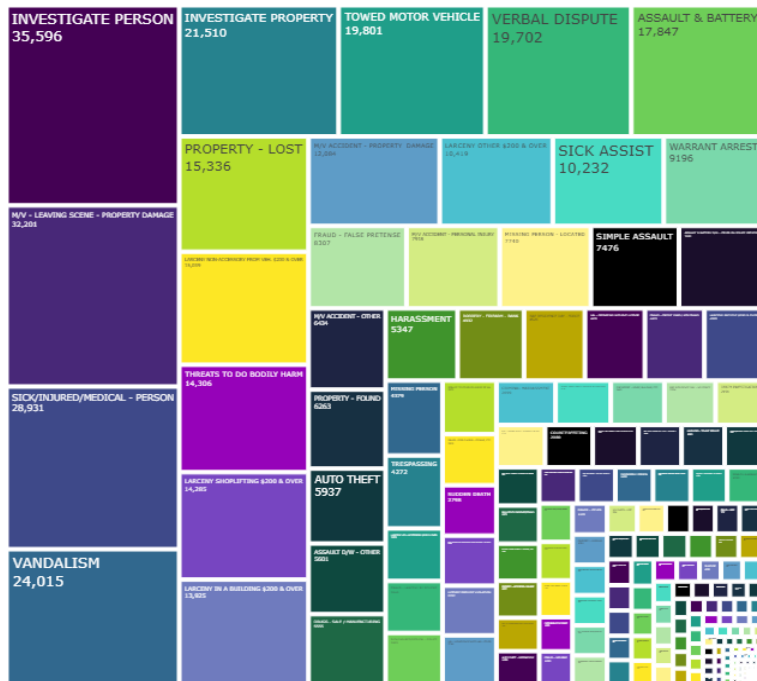
Does crime oftenly occurred on weekdays or more oftenly on weekend?

## Insight:

1. In line with the analysis before, we can see that there is a significant differences between number of crimes that occurred on weekend and weekdays.
2. Crimes on weekdays usually occurs on workhour, while crime on weekend usually occurs on non-workhour.

# INSIGHTS

## Offences of Crime in Boston on 2016-2021



## Question 7:

## What is most oftenly occurred crime's offences in Boston on 2016-2021?

## Insight:

From the Tree Map, we can see all of the crimes that occurred and their frequency of occurrence. Also, we can notice that that 'Investigate Person' is the most oftenly occurred crime's offences in Boston on 2016 - 2021

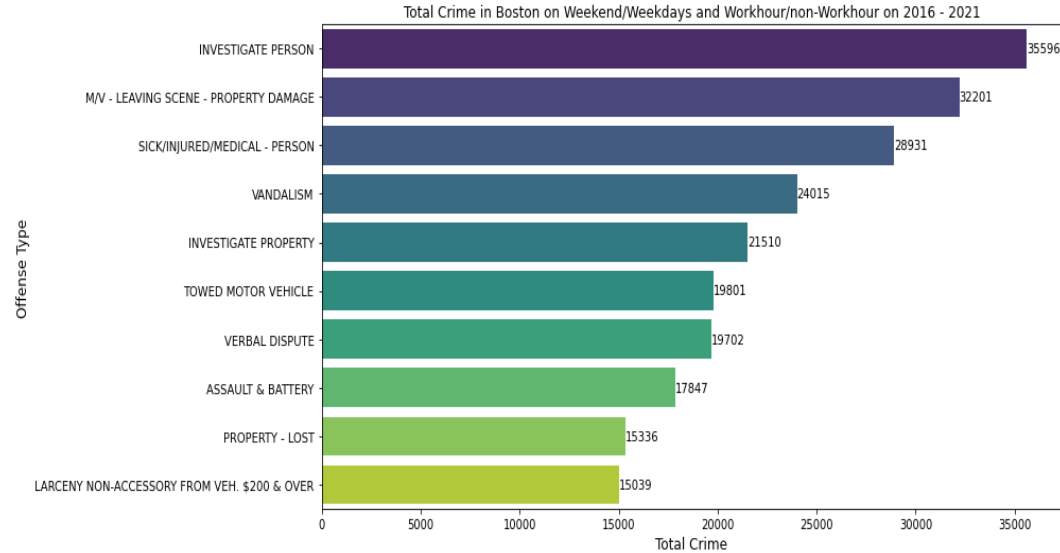
# INSIGHTS

## Question 8:

What is the top 10 most oftenly occurred crime's offences on Boston?

### Insight:

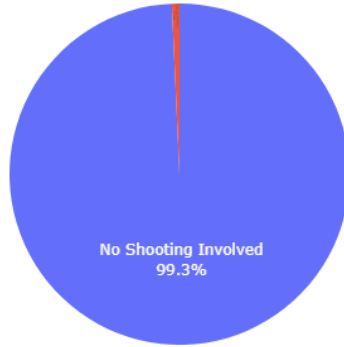
The crime's offense type that occurred the most on Boston is Investigate Person, followed by Motor Vehicle - Leaving Scene - Property Damage, and Sick/Injured/Medical - Person.



# INSIGHTS

Shooting Crime Proportion in Boston on 2016-2021

■ No Shooting Involved  
■ Shooting Involved



## Question 9:

Does crimes in Boston mostly involved shootings?

## Insight:

On the total crimes that occurred on Boston, there is actually a really small portion of crimes that involved shootings.



# INSIGHTS

## Question 10:

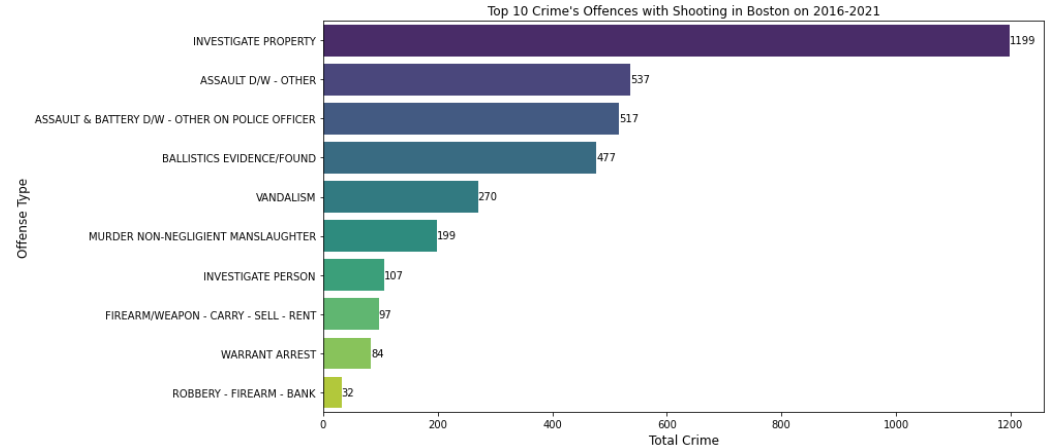
What is the crime's offences that shooting oftenly occurred?

## Insight:

1. On the graph, we can see the crime's offences where shooting is occurred and we can notice that there are no significant number of frequency except for 'Investigate Property' offences. This offence involved burglary, larceny-theft, motor vehicle theft, and arson (Source: <https://ucr.fbi.gov/crime-in-the-u.s/2010/crime-in-the-u.s.-2010/property-crime>)

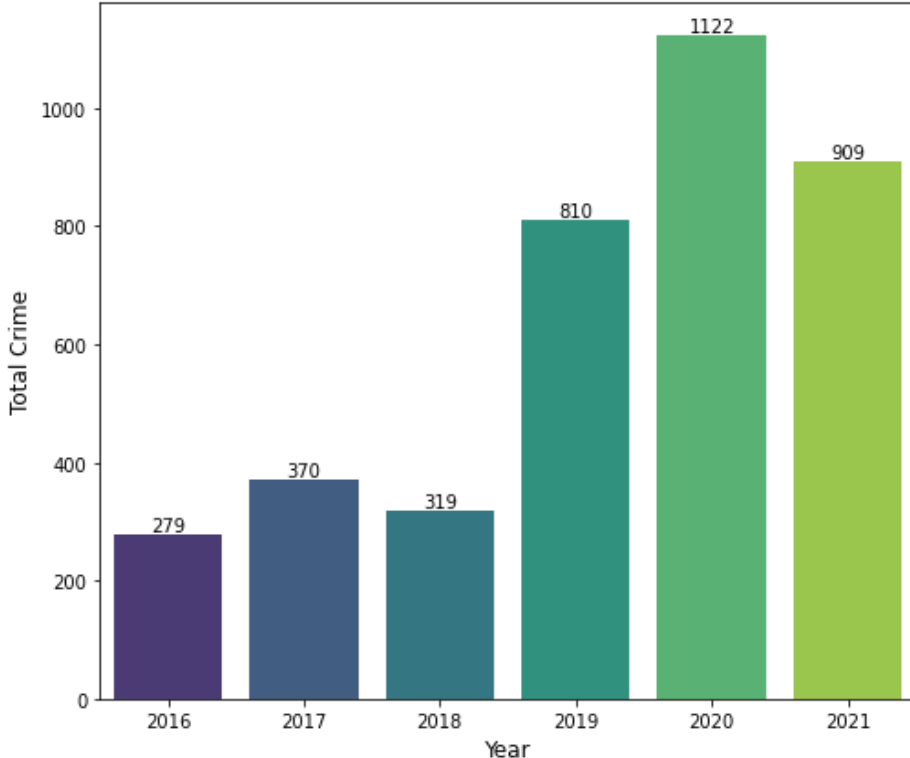
2. The other noticeable offences is assault D/W (deadly weapon) on Other and Police Officer, and Ballistic Evidence/Found. All of this offences is expected to have high number because it is directly involve with gun.

3. Even though that 'Investigate Person' is the type of offences that is mostly occurred in Boston on 2016 - 2021, the offences is rarely involving a shooting, with only 107 shooting in the period of 2016-2021.



# INSIGHTS

Total Shooting Crime in Boston per Year on 2016 - 2021



## Question 11:

How is the Shooting crime trend number year by year in Boston on 2016 to 2021?

## Insight:

The trend on shooting crime is different compared to trend on crime in general from 2016 to 2021. It can be seen that from 2016-2018, the changes never past 100 count, and then from 2018-2019, the number of shooting almost tripled from 319 to 810, and hit its peak on 2020 with 1.122 shooting crime.

While 2020 to 2021 the shooting number was reduced to 909, the number is still a lot higher than 2016-2018 numbers.

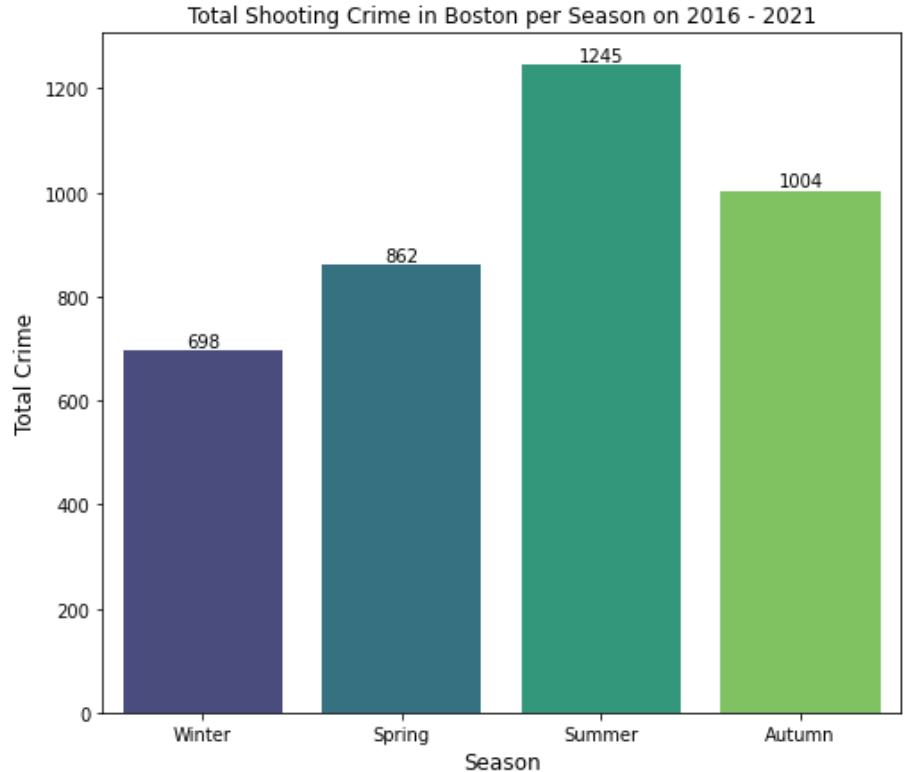
# INSIGHTS

## Question 12:

In which season does the shooting mostly occurred?

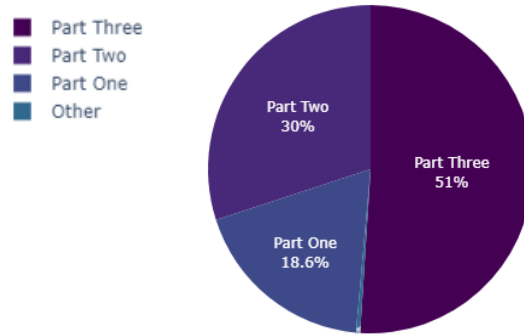
## Insight:

We can see that the trend for shooting crime is similar with crime in general. The numbers peaked on Summer and went down on Autumn and Winter, and will rise again in Spring.



# INSIGHTS

UCR Proportion in Boston on 2016-2018



## Question 13:

Which UCR classification that mostly occurred in Boston crime on 2016-2018?

## Insight:

Most of the crimes in Boston classified as UCR Part Three with the proportion of (51%) and 'Others' being the least classification with the proportion of just 0.4%.

## Uniform Crime Reporting (UCR)

The Uniform Crime Reporting (UCR) Program is a crime classification released by the FBI. It is mostly divided into two parts, Part one and Part two. However in this database there are three Parts. Part One, Part Two, and Part Three. At this moment, the writer can't found any reference mentioning the Part Three of UCR. But based on the description on FBI website, we can assume that Part Three is the less severe crime and Part One is the most severe crime.

Source:<https://ucr.fbi.gov/crime-in-the-u.s/2011/crime-in-the-u.s.-2011/offense-definitions>

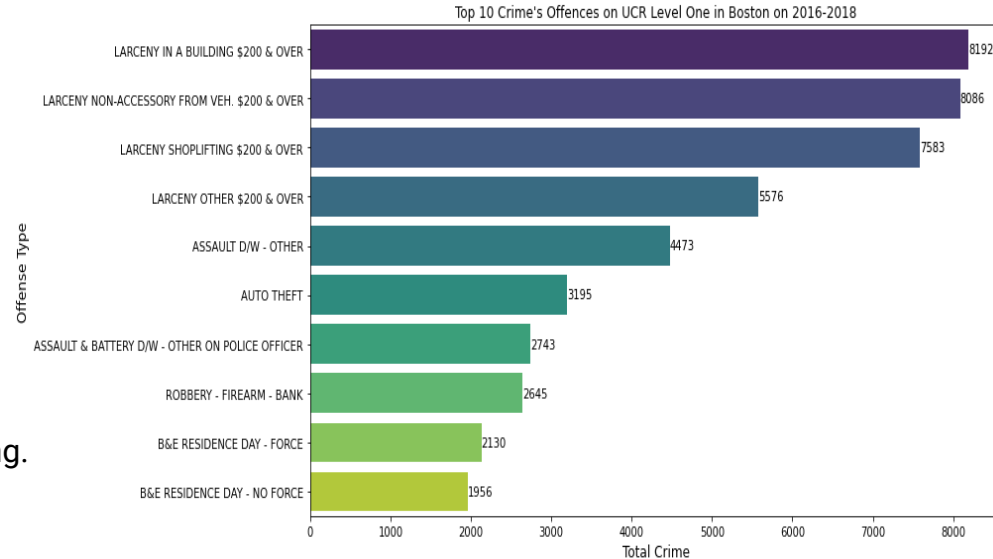
# INSIGHTS

## Question 14:

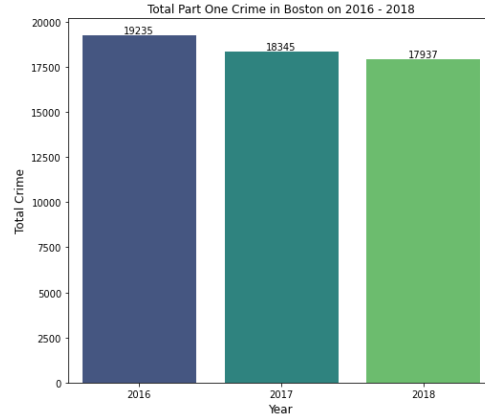
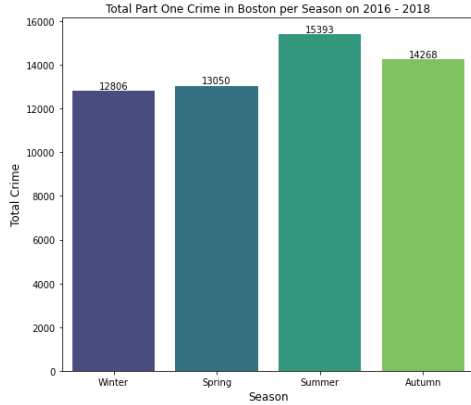
Which Crime's Classification Mostly Occurred on Part One Crime?

## Insight:

Crime offence's that usually most severe (Part One) is involving Larceny/Robbery, Assault, and Breaking & Entering.



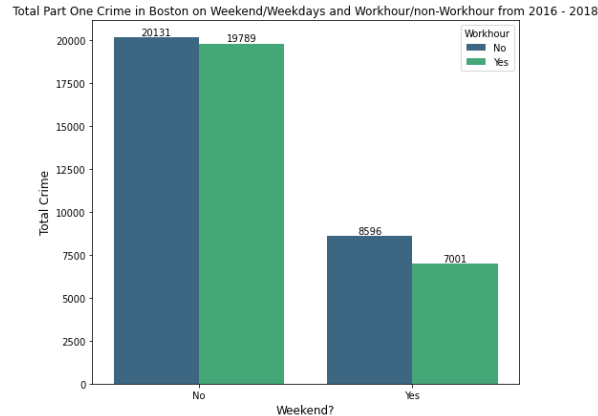
# INSIGHTS



## Question 15:

When does the Part One crime classification mostly occurred?

## Insight:



1. The trends for crime that is classified as Part One on UCR, is almost the same crime in general. The only difference is that the Part One crime is almost equally distributed in each season.

2. Highly severe crime mostly occurs on weekdays and outside of workhour (both on weekend and weekday)

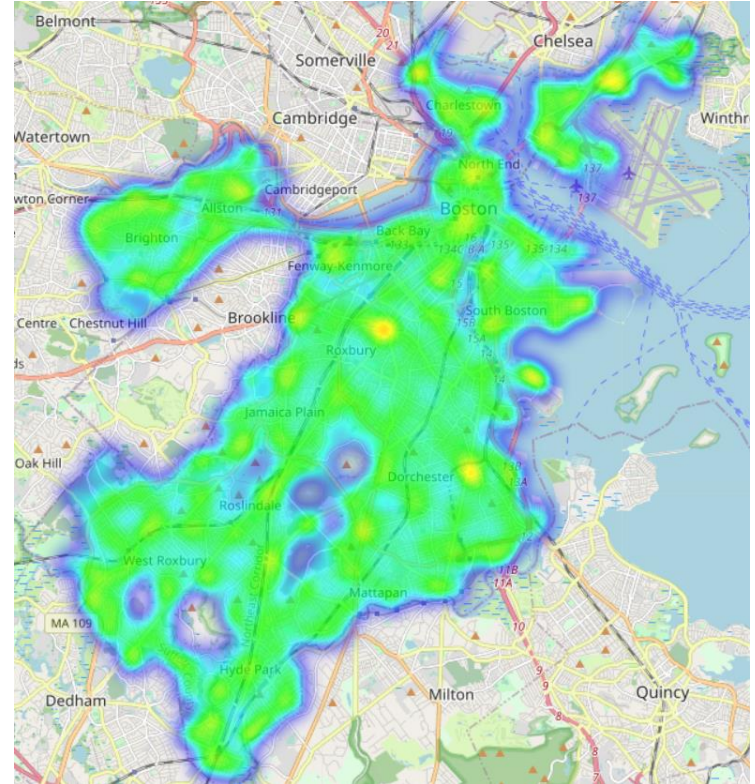
# INSIGHTS

## Question 16:

Where is the location and district where the crime in Boston most often occurred?

## Insight:

From the heatmap we can see that there are a lot of heat on Roxbury, Dorchester, and South End districts.



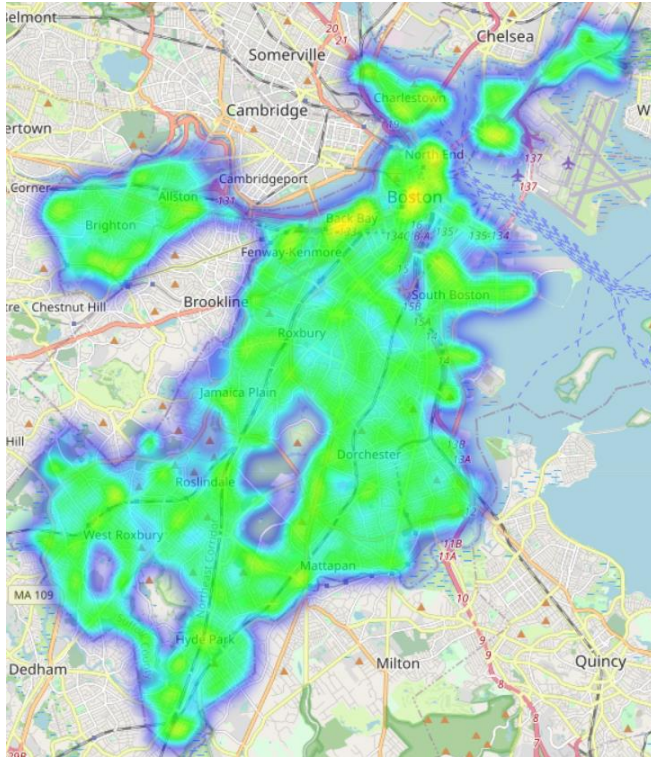
# INSIGHTS

## Question 17:

Where is the location and district where the Part One crime classification in Boston most often occurred?

## Insight:

From the heatmap, we can see that the highly severe crime often occurs on Boston's South End district. While the other district does not have higher heat like South End district.





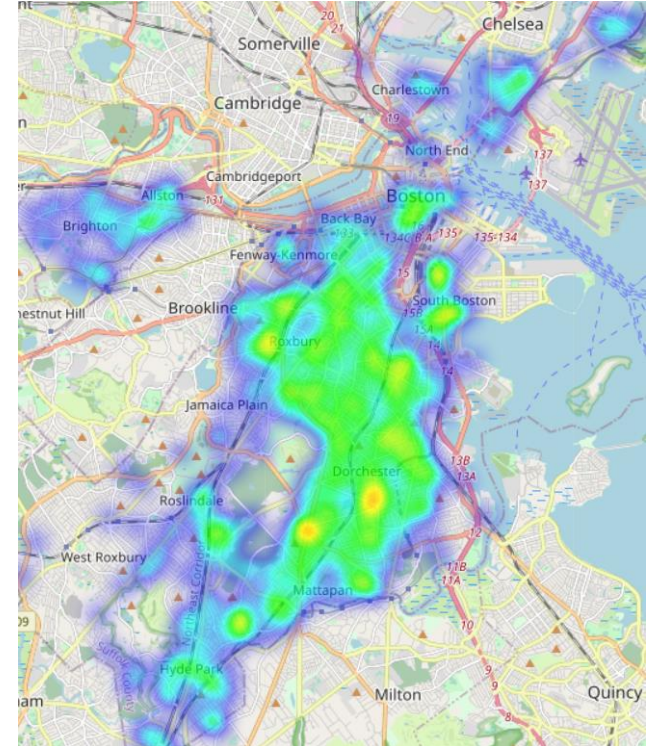
# INSIGHTS

## Question 18:

Where is the location and district where the crime involving shooting in Boston most often occurred?

## Insight:

Shooting often occurred around Roxbury, Mattapan, and Dorchester. On the other districts, the heat are not as high as those 3 districts.



# ANALYSIS AND RECOMMENDATION

## Analysis 1

Contrary to the research conducted by Pew Research, we have found that Crime in Boston actually rose from 2016-2017 and 2020-2021. However, it is true that crime number in USA generally went down year after year. This gaps between crime numbers in city and crime numbers nationally, is maybe the reason that lot of people believed that crime number is rising.

Source: <https://www.disastercenter.com/crime/uscrime.html>



# ANALYSIS AND RECOMMENDATION

## Recommendation 1



We can conclude that even though the crime rate is down nation-wide, but crime rate in Boston specifically is actually fluctuate over the year. To make the public feel safer, especially the locals/residents, one of the initiatives the government can take is NeighborhoodStat. NeighborhoodStat was envisioned by the New York City Mayor's Office of Criminal Justice (MOCJ) as a strategy for bringing residents together with city leadership to jointly address persistent challenges within the city's public housing developments. NeighborhoodStat empowers residents to set their own agenda for addressing the issues affecting the safety of their neighborhoods and puts in place a structure allowing them to partner with city leaders to bring their vision into reality.

New York's approach has proved effective. When MAP was founded in 2014, the target communities accounted for nearly 20 percent of violent crime across the city's 328 public housing developments. Since then, crime and violence have fallen significantly. Target communities have experienced an 11 percent reduction in violent crime and a 10 percent reduction in the major crime categories known as index crimes. And while crime rates have been trending downward across the city of New York, target developments have outpaced other New York City Housing Authority developments in crime reduction.

Source: <https://www.americanprogress.org/article/neighborhoodstat-strengthening-public-safety-community-empowerment/>

# ANALYSIS AND RECOMMENDATION

## Analysis 2

We found that crime number on Summer is the highest compared to other season. This finding is in line with the research conducted by U.S. Department of Justice, Bureau of Justice Statistics, that people are more likely to be a victim of violent crime during the summer season. And based on our findings, the UCR Part One is also having the highest occurrence on summer.

Source: <https://bjs.ojp.gov/content/pub/pdf/ics.pdf> and <https://www.thv11.com/article/news/crime/crime-increase-in-the-summer-time-yes/91-00e333f3-0cd3-4e54-8a51-5f98622f6692>



# ANALYSIS AND RECOMMENDATION

## Recommendation 2a

From a research entitled "Summer jobs reduce violence among disadvantaged youth." (Sara B. Heller, 2015), it is founded that Summer Jobs can lower the crime rate during summer, especially on teenager. The researcher have found 43% reduction in arrest for violent crimes among youths.

- Government: Based on that research, the government can give an extra incentive to the youth or family member that are willing to take the summer jobs program.
- Citizen/Residents: Citizen/Residents can encourage their relatives/family member to take the summer jobs program

*Source: Heller, Sara B. "Summer jobs reduce violence among disadvantaged youth." Science 346.6214 (2014): 1219-1223.*



# ANALYSIS AND RECOMMENDATION



## Recommendation 2b

Other initiatives that the government can take is the "Summer Crime Prevention Initiative" that is being run by DC Government since 2010. The initiative will focuses the Boston Police Department (BPD) to deploy all available resources and calls upon partner agencies and organizations to assist in a coordinated effort to eliminate violent crime in the district that have high-density of crime.

Source: <https://mpdc.dc.gov/page/summer-crime-prevention-initiative>

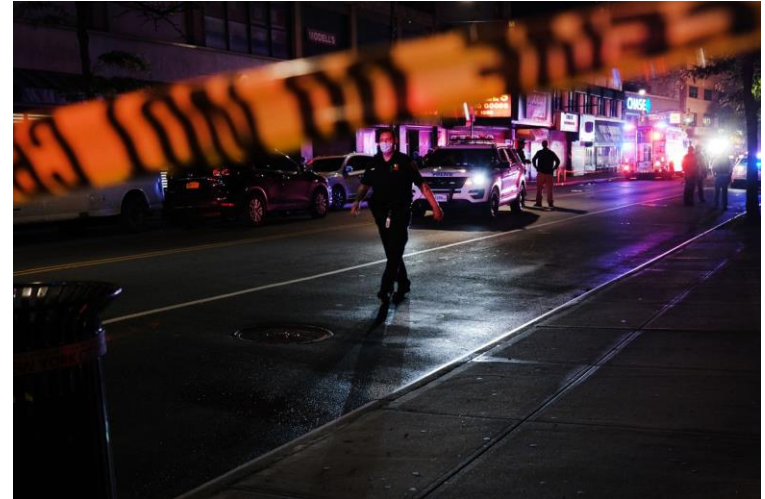


# ANALYSIS AND RECOMMENDATION

## Analysis 3

Based on our findings, we have found that crimes in general, mostly occurs on Weekdays on work-hour, While highly offensive crime (UCR Part One) oftenly occurs outside workhour. This finding is in line with the research that was published by The Sleep Judge entitled "The Crimes at Night: Analyzing Police Incident Reports in Major Cities" where they found that violent crimes occur most often at night and police incidents tend to happen between Monday and Friday.

Source: <https://www.thesleepjudge.com/crimes-that-happen-while-you-sleep>



# ANALYSIS AND RECOMMENDATION



## Recommendation 3

Other than the NeighborhoodStat initiatives, the government (including the police) and the residents of Boston can take an initiatives such as reducing alcohol availability, improving street connectivity, and providing green housing environments that is proven can reduce violent crimes (UCR Part One).

Also, the government and residents of Boston can make a regulation of curfew that is customized for each districts or neighborhood.

*Source: Kondo, Michelle C., et al. "Neighborhood interventions to reduce violence." Annual review of public health 39.1 (2018): 253-271.*



# ANALYSIS AND RECOMMENDATION

## Analysis 4

Most crime's offences in Boston are classified as medium-low severe, with most crime's offences that occurred are Investigate Person, Motor Vehicle incidents, and response to sick/medical/injured person. This finding's is also in line with shooting crime proportion in Boston which is very low (0.07%). However, we should notice that there are a significant uptrend of number of shooting crime in Boston. from 2018-2019, the number of shooting almost tripled from 319 to 810, and hit its peak on 2020 with 1.122 shooting crime. While 2020 to 2021 the shooting number was reduced to 909, the number is still a lot higher than 2016-2018 numbers.

From the analysis we know that shooting crimes oftenly occurred on burglary, larceny-theft, motor vehicle theft, and arson offence. The rising numbers of shooting on 2019 to 2020 is well may be caused by those crimes related to COVID-19 pandemic. Based on the research conducted by Matthew P. J. Ashby entitled "Initial evidence on the relationship between the coronavirus pandemic and crime in the United States", the research have found that public health crises affect crime rates. The chief of media relations for the Boston Police Department, Sgt. Detective John Boyle, has said that due to the widespread unemployment brought upon many people by the pandemic, Boston Police expected property crimes such as breaking-and-entering, theft, robbery. In which, those crimes are oftenly include shooting.

Source: Ashby, Matthew PJ. "Initial evidence on the relationship between the coronavirus pandemic and crime in the United States." *Crime Science* 9.1 (2020): 1-16, and <https://thesuffolkjournal.com/36697/news/the-covid-19-pandemic-and-its-effect-on-bostons-crime-rate/>



# ANALYSIS AND RECOMMENDATION

## Recommendation 4

Based on the research conducted by Sanchez, Carol, et al. entitled "A systematic review of the causes and prevention strategies in reducing gun violence in the United States." on 2020, the researchers have found that Gun violence is pervasive and multi-factorial. Interventions aimed at reducing gun violence should be targeted towards the most common risk factors cited in the literature such as access, violent behavioral tendencies due to past exposure or substance abuse, and mental illness including suicidal ideation.

Related to that findings, the action that can be taken by the governments are:

- Reduce easy access to dangerous weapons. e.g.: Mandatory background check for people who want to buy a gun
- Support gun violence research. e.g.: Ensure that the Centers for Disease Control and Prevention (CDC) and others have the resources to study this issue and provide science-based guidance.
- Hold the gun industry accountable and ensure there is adequate oversight over the marketing and sales of guns and ammunition.

Other policies that can be taken by the governments are limiting children's access to guns, restricting concealed-carry permits, and restricting "stand your ground" policies. Based on the research conducted by Michael Price on 2020, these 3 policies can reduce gun deaths by more than 10%.



Source: <https://www.preventioninstitute.org/focus-areas/preventing-violence-and-reducing-injury/preventing-violence-advocacy>  
<https://www.science.org/content/article/three-types-laws-could-reduce-gun-deaths-more-10>

# ANALYSIS AND RECOMMENDATION

## Analysis 5

From the data analysis, we can conclude that Roxbury, Dorchester, Mattapan, and South End is the districts where most crime occurred

## Recommendation 5

The government and the citizen of the hot-spot district can work together to implement an action that can help to reduce crime such as:

- Improvements to the public realm—such as urban greening and tree canopy programs in urban neighborhoods.

Source: Kondo MC, South EC, Branas CC, Richmond TS, Wiebe DJ. *The association between urban tree cover and gun assault: a case-control and case-crossover study.*

- Increasing the number of spaces for informal contact between neighbors.

Source: Sullivan, W. C., Kuo, F. E., & Depooter, S. F. (2004). *The fruit of urban nature: Vital neighborhood spaces.* *Environment and behavior*, 36(5), 678-700

- Create a Community-Based and Civic Organizations in leading anti-violence programs.

Source: Sharkey, P. (2018). *Uneasy peace: The great crime decline, the renewal of city life, and the next war on violence.* WW Norton & Company.



**THANK YOU!**

# Reference

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22. Sharkey, P. (2018). *Uneasy peace: The great crime decline, the renewal of city life, and the next war on violence*. WW Norton & Company.