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Project 2: Analysis of NYPD Hate Crimes

Project Report

Group 6

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Introduction

An analysis of hate crimes in New York City emphasizes the significance of well-informed intervention in a society where data is driving decisions increasingly. The NYPD's Hate Crimes Analysis report examines all the incidents that are on file, including qualitative insights like the reasons for the crimes as well as quantitative statistics like the frequency and locations of these acts. Our goal is to conduct thorough data analysis using Python libraries, utilizing statistical methods, and producing visualizations to identify underlying patterns and trends. By identifying the most frequent offenses, the populations most affected, and the timing of these incidents, this strategy will help shed light on the landscape of hate crimes.

Our study aims to provide valuable information to relevant parties, including community leaders, legislators, and law enforcement, so they can create efficient preventative measures. This effort underscores our dedication to enhancing the safety and inclusivity of New York City, benefiting everyone who lives in or visits this dynamic city.

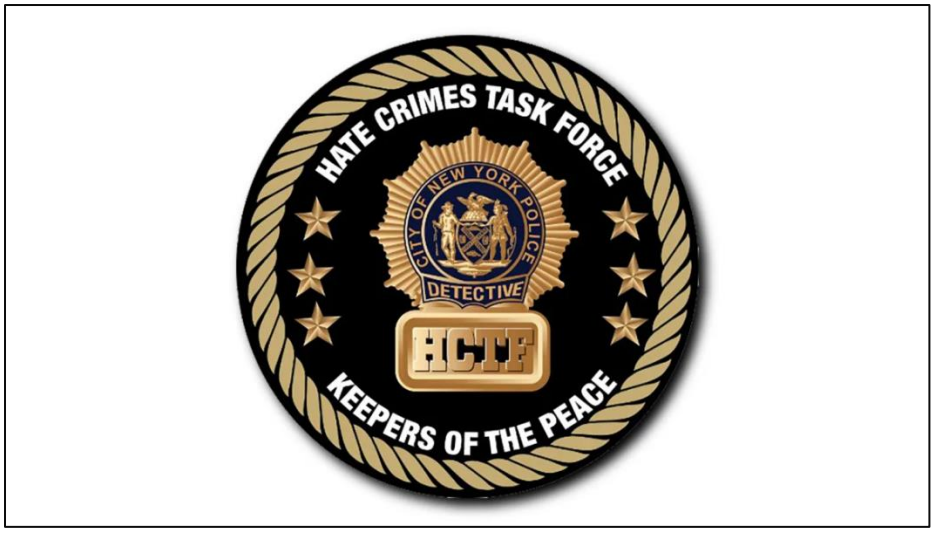

Figure 1: NYPD Hate Crimes Task Force

Project Objectives

- The project aims to analyze the NYPD Hate Crimes dataset to uncover trends and patterns in hate crimes over recent years. By examining data such as the geographical distribution, bias motives, and offense categories, we seek to identify areas with higher incidences and the most common types of bias-related offenses. Additionally, we will study the relationship between reported hate crimes and arrests to understand law enforcement responses.
- This analysis will help in understanding the temporal patterns, comparing data across years, and potentially predicting future hotspots, thereby providing valuable insights for policymakers and law enforcement agencies.

Raw Data

The dataset from the NYPD Hate Crimes report contains 2,870 entries and 14 columns. Here is an overview of the key details:

- **Full Complaint ID**: Unique identifier for each complaint.
- **Complaint Year Number**: The year the complaint was made.
- **Month Number**: The month the complaint was made.

- **Record Create Date**: Date the record was created.
- **Complaint Precinct Code**: Precinct code where the complaint was filed.
- **Patrol Borough Name**: Borough where the precinct is located.
- **County**: The county of the incident.
- **Law Code Category Description**: Classification of the law code.
- **Offense Description**: Description of the offense.
- **PD Code Description**: Police department code description.
- **Bias Motive Description**: Description of the motive behind the hate crime.
- **Offense Category**: Category of the offense.
- **Arrest Date**: Date of any arrest made.
- **Arrest Id**: ID of the arrest (if applicable).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Full Compl	Complaint	Month Nun	Record Cre	Complaint	Patrol Bor	County	Law Code (	Offense De	PD Code D	Bias Motive	Offense Ca	Arrest Date	Arrest Id			
2.02E+14	2019	1	01/23/201	60	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	2	02/25/201	60	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	2	02/27/201	60	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	4	04/16/201	60	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	6	06/20/201	60	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	7	07/31/201	60	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	9	########	60	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	11	11/21/201	60	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	5	05/18/201	61	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	6	########	61	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	6	06/14/201	61	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	8	########	61	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	12	########	61	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	5	05/20/201	62	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	4	########	63	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	6	06/19/201	66	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	9	09/25/201	66	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	11	########	66	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	8	08/20/201	67	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	5	########	70	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	12	12/31/201	71	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	2	02/17/201	72	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	8	08/28/201	72	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	1	01/29/201	78	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					
2.02E+14	2019	12	12/27/201	78	PATROL BO	KINGS	FELONY	MISCELLAI	AGGRAVA	ANTI-JEWI	Religion/Religious Practice					

Figure 2: Raw Data from the dataset

Data Pre-Processing

In this project, we begin by importing the dataset from a CSV file obtained from data.gov.

After loading the data into a pandas DataFrame, we proceeded to obtain an initial understanding of the dataset by using the df.info() and df.describe() commands. These commands are crucial for summarizing the structure and basic statistics of the dataset, allowing us to identify potential data issues and gain insights into its composition. df.info() helped us understand the dataset's structure, identify columns with missing data, and verify the data types and df.describe() provided a quick overview of the central tendency, dispersion, and shape of the distribution of the numerical columns, helping us to understand the data better and identify any anomalies.

```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

#Load the dataset
data = pd.read_csv('NYPD_Hate_Crimes.csv')
```

```
data
```

	Full Complaint ID	Complaint Year Number	Month Number	Record Create Date	Complaint Precinct Code	Patrol Borough Name	County	Law Code Category Description	Offense Description	PD Code Description	Bias Motive Description	Offense Category
0	201906012119317	2019	1	01/23/2019	60	PATROL BORO BKLYN SOUTH	KINGS	FELONY	MISCELLANEOUS PENAL LAW	AGGRAVATED HARASSMENT 1	ANTI-JEWISH	Religion/Religious Practice
1	201906012175717	2019	2	02/25/2019	60	PATROL BORO BKLYN SOUTH	KINGS	FELONY	MISCELLANEOUS PENAL LAW	AGGRAVATED HARASSMENT 1	ANTI-JEWISH	Religion/Religious Practice
2	201906012180117	2019	2	02/27/2019	60	PATROL BORO BKLYN SOUTH	KINGS	FELONY	MISCELLANEOUS PENAL LAW	AGGRAVATED HARASSMENT 1	ANTI-JEWISH	Religion/Religious Practice
3	201906012273417	2019	4	04/16/2019	60	PATROL BORO BKLYN SOUTH	KINGS	FELONY	MISCELLANEOUS PENAL LAW	AGGRAVATED HARASSMENT 1	ANTI-JEWISH	Religion/Religious Practice

Figure 3: Screenshot showing the data file import

```
#Information about Dataset
data.info()
data.describe()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2870 entries, 0 to 2869
Data columns (total 14 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   Full Complaint ID             2870 non-null   int64
 1   Complaint Year Number         2870 non-null   int64
 2   Month Number                  2870 non-null   int64
 3   Record Create Date            2870 non-null   object
 4   Complaint Precinct Code       2870 non-null   int64
 5   Patrol Borough Name           2870 non-null   object
 6   County                        2870 non-null   object
 7   Law Code Category Description 2870 non-null   object
 8   Offense Description           2870 non-null   object
 9   PD Code Description           2870 non-null   object
 10  Bias Motive Description       2870 non-null   object
 11  Offense Category              2870 non-null   object
 12  Arrest Date                   1216 non-null   object
 13  Arrest Id                     1216 non-null   object
dtypes: int64(4), object(10)
memory usage: 314.0+ KB
```

	Full Complaint ID	Complaint Year Number	Month Number	Complaint Precinct Code
count	2.870000e+03	2870.00000	2870.000000	2870.000000
mean	2.021553e+14	2021.49338	6.319164	58.996516
std	1.483620e+11	1.48366	3.440965	38.028937
min	2.019001e+14	2019.00000	1.000000	1.000000
25%	2.020120e+14	2020.00000	3.000000	19.000000
50%	2.022014e+14	2022.00000	6.000000	63.000000
75%	2.023019e+14	2023.00000	9.000000	90.000000

Figure 4: Screenshot showing the output of Statistical Summary

Further, we went on to draw some insights from the dataset to enhance our understanding of the dataset.

Top 5 Countries with the highest crime rates:
The analysis and output highlight the countries with the highest crime rates (*Figure 5*). These numbers indicate that New York County (often referring to Manhattan) has the highest number of reported hate crimes, followed by Kings (Brooklyn), Queens, Bronx, and Richmond (Staten Island) counties. This information can be useful for understanding the geographical distribution of hate crimes within New York City and for targeting interventions.

```
#Top 5 County with highest crime rates
top_five_county = data['County'].value_counts().head(5)
print(top_five_county)
```

```
NEW YORK    1064
KINGS        982
QUEENS       526
BRONX        188
RICHMOND     110
Name: County, dtype: int64
```

Figure 5: Screenshot showing the Top 5 Countries with the highest crime rates

Data Cleaning and Preparation

Initially, we examined the dataset for missing values and duplicates. We found no duplicates, but there were missing entries in several columns (*Figure 6*).

Data Cleaning and Preparation

[5]:
```
#Checking for missing values and duplicate rows
def checking_for_missingVals_and_duplicates():
    # Check for missing values in the dataset
    missing_values = data.isnull().sum()
    print("Missing values in the dataset: ",missing_values)
    # Check for duplicate rows in the dataset
    duplicate_rows = data.duplicated().sum()
    print("No. of duplicate rows in the dataset: ",duplicate_rows)
checking_for_missingVals_and_duplicates()
```

```
Missing values in the dataset:  Full Complaint ID                 0
Complaint Year Number             0
Month Number                      0
Record Create Date                0
Complaint Precinct Code           0
Patrol Borough Name               0
County                            0
Law Code Category Description     0
Offense Description               0
PD Code Description               0
Bias Motive Description           0
Offense Category                  0
Arrest Date                    1654
Arrest Id                      1654
dtype: int64
No. of duplicate rows in the dataset:  0
```

Figure 6: Screenshot showing the function to check missing values and duplicate rows

First, the function calculates the number of missing values in each column of the DataFrame. It uses `df.isnull().sum()` to accomplish this. The `isnull()` method returns a DataFrame of the same shape, with boolean values indicating the presence of nulls (True for null, False for non-null). The `sum()` method then aggregates these boolean values column-wise, resulting in a count of missing values for each column. This count is stored in the variable `missing_values`. A print statement follows, displaying the count of missing values for each column in the dataset. The output shows that every column in the DataFrame has zero missing values, indicating a complete dataset with no missing entries.
Next, the function checks for duplicate rows within the DataFrame. It employs the `df.duplicated().sum()` method for this task. The `duplicated()` method returns a Series where each element is a boolean value

indicating whether the corresponding row is a duplicate. The `sum()` method counts the number of True values in this Series, which corresponds to the number of duplicate rows. This count is stored in the variable `duplicate_rows`. Another print statement follows, outputting the number of duplicate rows in the dataset. The result shows that there are no duplicate rows, as indicated by the count of zero.
Overall, the function `checking_for_missingVals_and_duplicates` efficiently confirms the integrity of the DataFrame `df` by verifying the absence of both missing values and duplicate rows. This outcome suggests that the dataset is well-prepared for further analysis or processing, free from these common data quality issues that could otherwise complicate subsequent steps in data handling and analysis. The clear output of the function enhances its utility, providing immediate insights into the dataset's quality (*Figure 7*).

```
[9]: #Checking for missing values and duplicate rows
def checking_for_missingVals_and_duplicates():
    # Check for missing values in the dataset
    missing_values = df.isnull().sum()
    print("Missing values in the dataset: ",missing_values)
    # Check for duplicate rows in the dataset
    duplicate_rows = df.duplicated().sum()
    print("No. of duplicate rows in the dataset: ",duplicate_rows)
checking_for_missingVals_and_duplicates()
```

```
Missing values in the dataset:  Full Complaint ID               0
Complaint Year Number           0
Month Number                    0
Record Create Date              0
Complaint Precinct Code         0
Patrol Borough Name             0
County                          0
Law Code Category Description   0
Offense Description             0
PD Code Description             0
Bias Motive Description         0
Offense Category                0
Arrest Date                     0
Arrest Id                       0
dtype: int64
No. of duplicate rows in the dataset:  0
```

Figure 7: Screenshot showing the function which handles the missing values

Data Visualization

1. Bar Graph - Yearly Trend of Hate Crimes

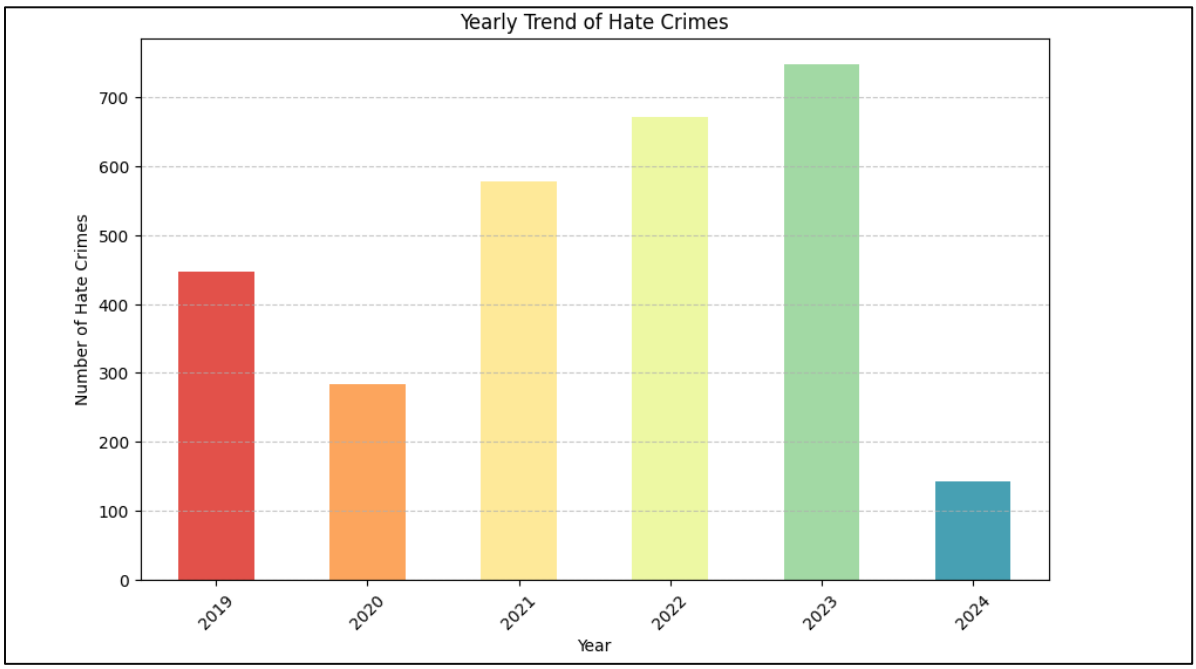

Figure 8: Yearly trend of Hate Crimes

Insights:

- From *Figure 8*, there is a noticeable upward trend in the number of hate crimes from 2019 to 2023. The count has increased significantly each year, peaking in 2023.
- The most significant increase occurred between 2022 and 2023, where the number of hate crimes rose by about 100.
- The sharp decline from 2023 to 2024 is also significant, suggesting a potentially positive development or a need for additional data to understand the full year.
- The decline in 2020 might be attributable to external factors such as the COVID-19 pandemic, which affected many social dynamics and could have influenced the reporting or occurrence of hate crimes.
- The increasing trend from 2021 to 2023 might reflect growing societal issues, better-reporting mechanisms, or increased awareness.
- The data for 2024 is significantly lower than previous years, which could indicate that the year is incomplete or that effective measures have been taken to reduce hate crimes. Further investigation is required to understand this anomaly.

2. Pie Chart - Hate Crimes by County

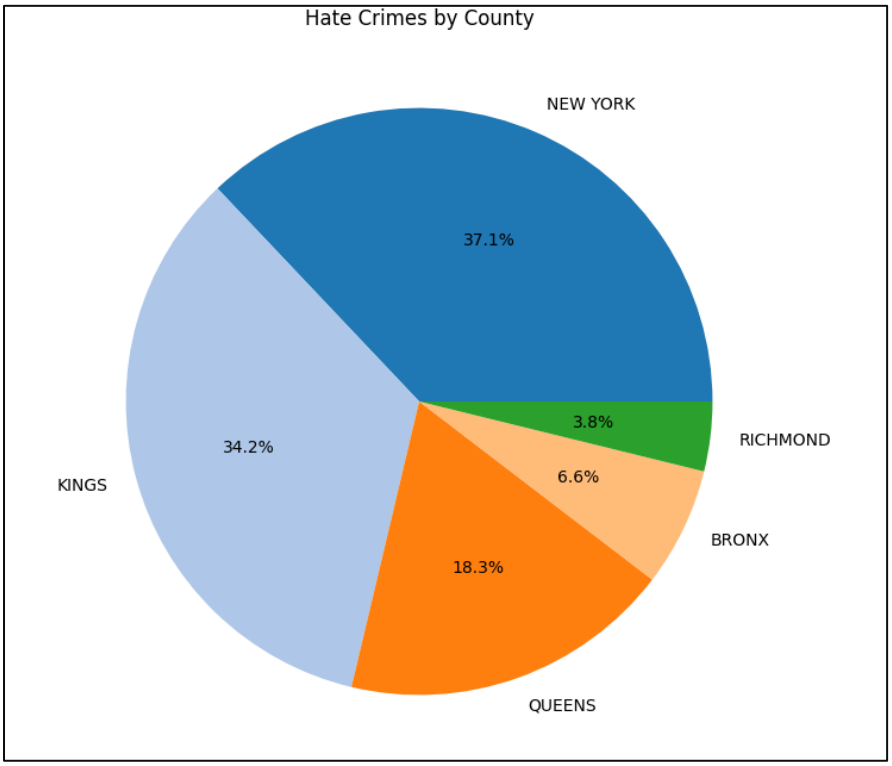

Figure 9: Hate Crimes by Country

Insights:

- The "Hate Crimes by County" pie chart (*Figure 9*) reveals that hate crimes are predominantly concentrated in New York County and Kings County, which together account for over 70% of the total reported incidents, with 37.1% and 34.2%, respectively.
- This indicates a significant issue in these areas, suggesting that targeted interventions and resources are crucial for these regions.
- Queens County, while significantly lower, still represents a notable 18.3% of hate crimes, highlighting the need for attention there as well.

- Bronx County and Richmond County have the lowest shares, at 6.6% and 3.8% respectively, indicating fewer incidents in these areas.
- However, despite their lower percentages, these regions require appropriate measures to address and prevent hate crimes.
- Overall, the data suggests that while hate crimes are a widespread issue, specific counties such as New York and Kings need more focused efforts to tackle the higher incidence rates.

3. Line Graph – Hate Crimes Trend in New York over the years

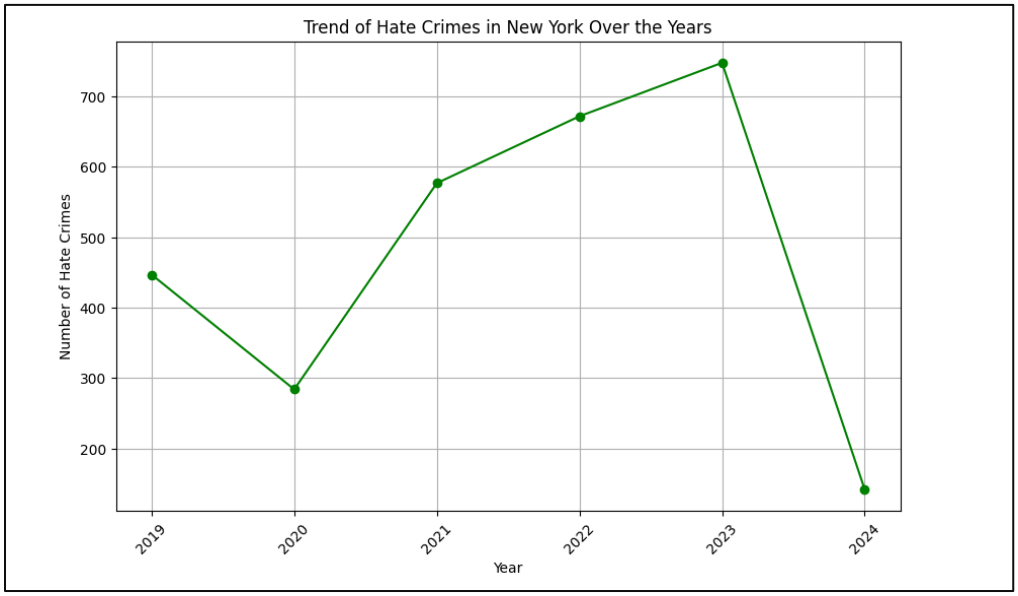

Figure 10: Hate Crimes Trend in New York over the years

Insights:

- The "Trend of Hate Crimes in New York Over the Years" line graph (*Figure 10*) illustrates significant fluctuations in the number of hate crimes from 2019 to 2024.
- The data shows an initial decline from around 450 hate crimes in 2019 to approximately 300 in 2020, likely influenced by external factors such as the COVID-19 pandemic.
- Following this, there is a notable increase in 2021, with hate crimes rising to about 500.
- This upward trajectory continues into 2022 and peaks in 2023 with approximately 700 hate crimes, indicating a worrying trend of escalating hate crimes during these years.
- However, 2024 sees a dramatic drop to around 200 hate crimes, suggesting either a significant positive intervention or incomplete data for the year.
- This sharp decline contrasts sharply with the preceding upward trend, highlighting the need for further analysis to understand the factors contributing to this decrease and whether it signifies a lasting positive change or an anomaly.

4. Line graph – Trend of Hate Crimes in Richmond Over the Years

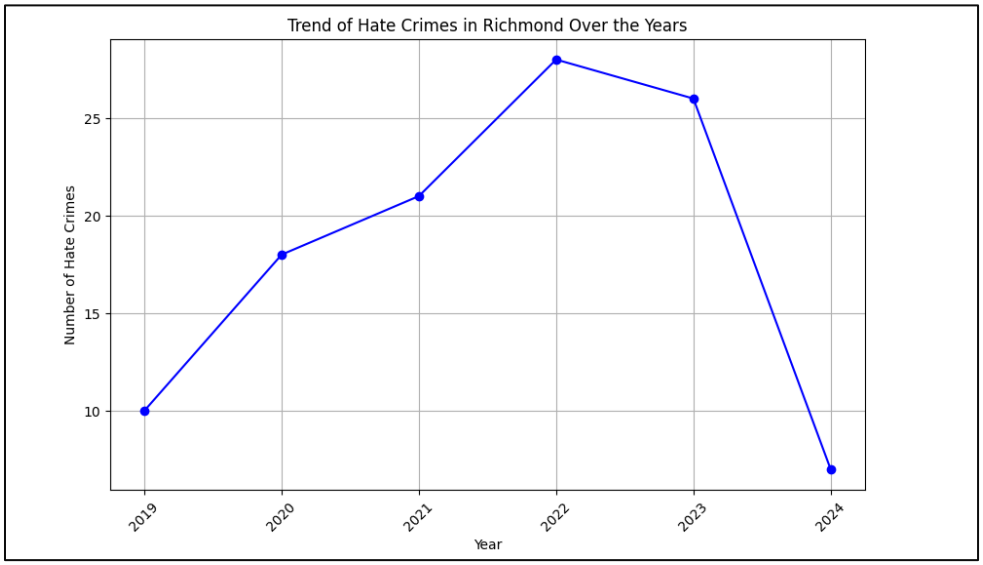

Figure 11: Trend of Hate Crimes in Richmond Over the years

Insights:

- The "Trend of Hate Crimes in Richmond Over the Years" line graph (*Figure 11*) shows a gradual increase in hate crimes from 2019 to 2022, followed by a sharp decline in 2023 and 2024.
- Starting at around 10 hate crimes in 2019, the number steadily rises each year, reaching approximately 15 in 2020, 20 in 2021, and peaking at around 25 in 2022.
- This upward trend indicates a growing issue with hate crimes in Richmond during these years. However, 2023 marks the beginning of a significant decrease, with the number of hate crimes dropping to about 20, and then plummeting to nearly zero in 2024.
- This sharp decline could suggest effective interventions or changes in reporting practices, but it also warrants further investigation to determine whether this decrease is sustainable or if other factors are at play.
- The data highlights the need for continued efforts to address and mitigate hate crimes in Richmond, especially considering the previous upward trend.

5. Histogram – Monthly Distribution of hate crimes over the years

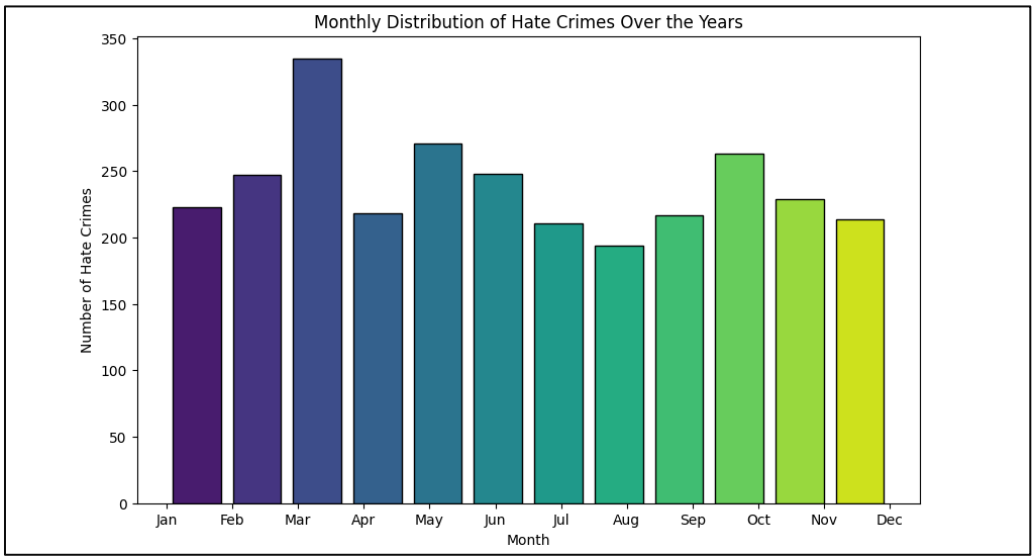

Figure 12: Monthly Distribution of Hate Crimes over the years

Insights:

- *Figure 12* shows the monthly distribution of hate crimes over a year.
- There is a clear seasonal pattern, with hate crimes peaking in March and then declining steadily through the summer months, reaching a low point in August or September.
- The number of hate crimes starts increasing again in the fall months, with a noticeable uptick in October and November.
- December also sees a relatively high number of hate crimes, though not as high as the peak in March.
- The months with the highest incidence of hate crimes are March, February, and January, in that order.
- The months with the lowest incidence of hate crimes are August, July, and September.
- The variation between the peak month (March) and the lowest month (August) is substantial, indicating a significant seasonal fluctuation in the occurrence of hate crimes.
- Comparing both charts suggests that hate crimes might have some seasonal patterns. The monthly distribution chart indicates certain months have higher hate crime rates, which might correlate with yearly variations observed in the trend chart.

6. Bar Graph – Top 10 Bias Motives for Hate Crimes

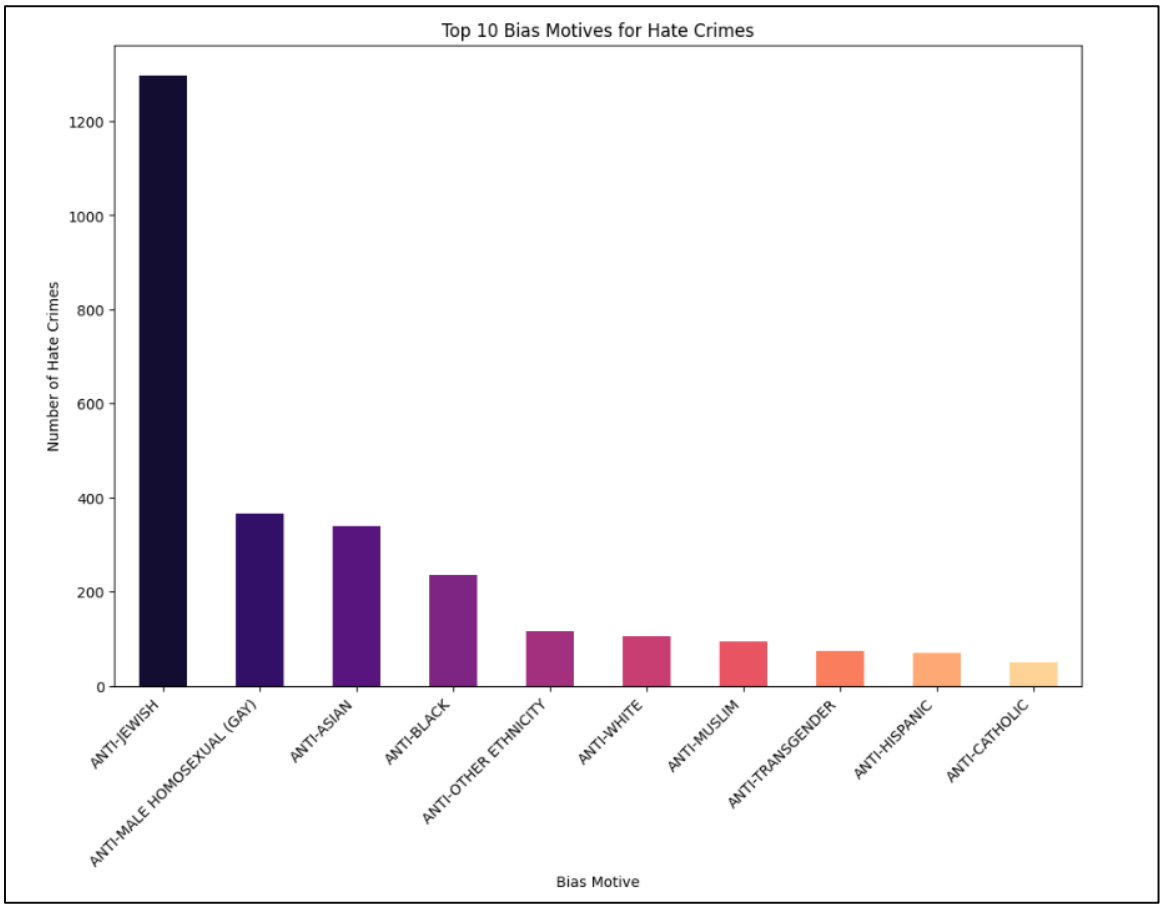

Figure 13: Top 10 Bias Motives for Hate Crimes

Insights:

- From *Figure 13*, Anti-Black or African American bias is by far the most prevalent motive for hate crimes, with a significantly higher number of incidents compared to the other motives.
- The second and third highest bias motives are anti-male homosexual or gay, and anti-Jewish, respectively.

- Other notable bias motives in the top 10 include anti-Asian, anti-other ethnicity/ancestry, anti-White, anti-Hispanic or Latino, and anti-Muslim.
- There is a considerable gap between the top three bias motives (anti-Black, anti-gay, anti-Jewish) and the remaining motives, suggesting these groups are disproportionately targeted for hate crimes.
- The number of hate crimes decreases substantially for the lower-ranked bias motives, such as anti-transgender, anti-Arab, and anti-Catholic.
- The chart highlights the prevalent nature of hate crimes motivated by racial, religious, and sexual orientation biases, with certain groups being more vulnerable targets than others.
- By comparing both charts, it can be inferred that the months with higher hate crime incidents might have spikes in specific bias motives. For example, a peak in March could correspond to an increase in Anti-Jewish or Anti-Asian hate crimes, which are prominent in the second chart.

7. Box Plot – Distribution of hate crimes by Borough

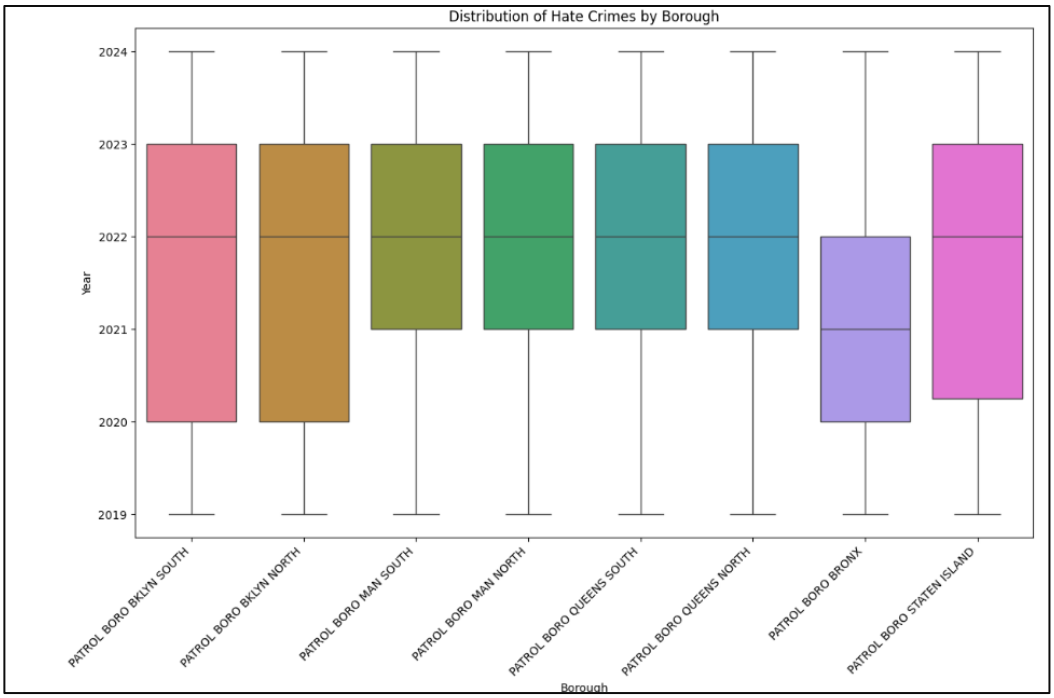

Figure 14: Distribution of Hate Crimes by Borough

Insights: The image (*Figure 14*) presents a distribution of hate crimes across different boroughs over multiple years, likely from 2019 to 2024. The boroughs are represented on the x-axis, and the y-axis shows the years. The height of the colored bars indicates the relative frequency or number of hate crimes reported in each borough for a given year.

Here are some insights from the distribution:

- The Bronx appears to have the highest number of hate crimes consistently across the years, as represented by the tallest purple bars.
- Brooklyn (represented by the blue bars) also seems to have a significant number of hate crimes, though generally lower than the Bronx.
- Queens (green bars) and Manhattan (orange bars) have lower levels of hate crimes compared to the Bronx and Brooklyn, but are still a notable presence.
- Staten Island (pink bars) and a borough labeled "Patrol Borough Queens South" (brown bars) appear to have the lowest levels of hate crimes among the boroughs shown.

8. Correlation Heatmap

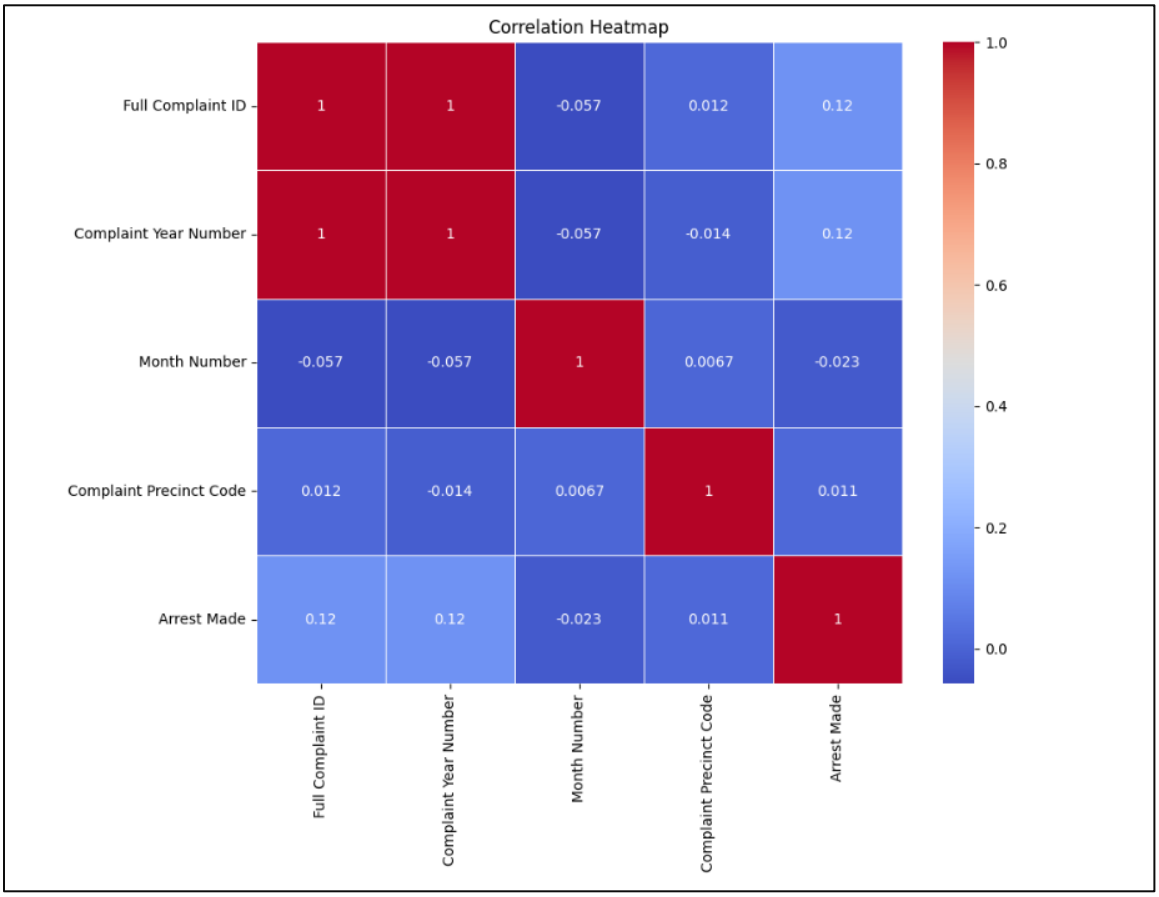

Figure 15: Heat Map

Insights: The image (*Figure 15*) presents a correlation heatmap that shows the relationships between different variables related to hate crime incidents. The color scale ranges from blue (negative correlation) to red (positive correlation), with darker shades indicating stronger correlations.

Here are some insights from the correlation heatmap:

- The variables "Full Complaint ID" and "Complaint Year Number" have a perfect positive correlation of 1.0 with themselves, which is expected as a variable is always perfectly correlated with itself.
- There is a moderate negative correlation (-0.057) between "Month Number" and both "Full Complaint ID" and "Complaint Year Number." This suggests that as the month number increases, the complaint ID and year number tend to decrease, or vice versa.
- The variable "Complaint Precinct Code" has a weak positive correlation (0.011) with "Arrest Made," indicating a slight tendency for arrests to be more likely in certain precincts.
- There is a weak negative correlation (-0.023) between "Month Number" and "Arrest Made," suggesting that arrests for hate crimes may be slightly less likely in certain months.
- The strongest positive correlation (1.0) is observed between "Full Complaint ID" and "Complaint Year Number," which is expected as these variables are likely related or derived from each other.
- Most of the correlations between the variables are relatively weak, with values close to zero, implying that there may not be strong linear relationships between many of these variables.

9. Heatmap – Heat Map of Hate Crimes Across Different Precincts Over the Years

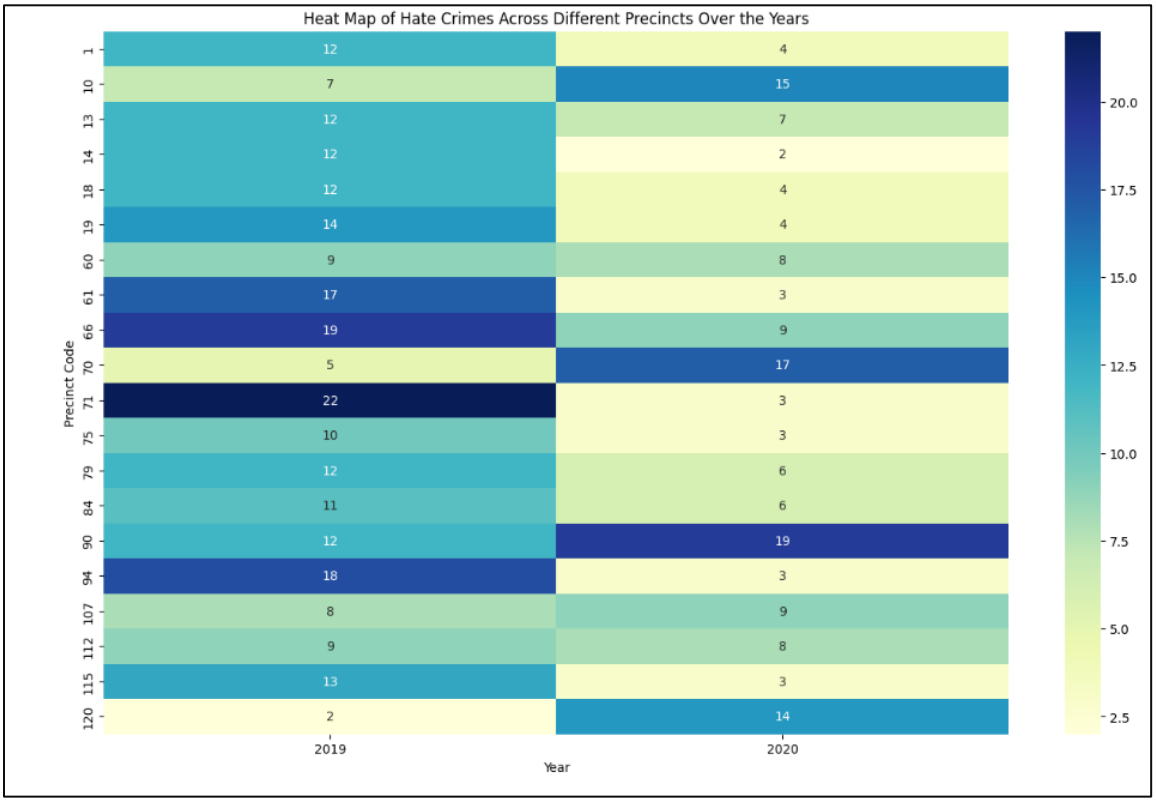

Figure 16: Heatmap of Hate Crimes Across Different Precincts Over the Years

- The heat map (*Figure 16*) represents the distribution of hate crimes across different precincts over two years, 2019 and 2020. The color gradient from blue to yellow indicates the frequency or number of hate crimes, with darker shades representing higher frequencies.

Here are some insights from the heat map:

- There appears to be a significant increase in the number of hate crimes from 2019 to 2020 across most precincts, as indicated by the larger yellow bars in 2020.
- Precinct 6 stands out as having the highest frequency of hate crimes in both years, with a substantial increase from 2019 to 2020.
- Precincts 4 and 5 also show a notable rise in hate crime incidents from 2019 to 2020, suggesting potential hotspots or areas of concern.
- While most precincts experienced an increase, there are a few exceptions, such as Precincts 11 and 13, where the frequency of hate crimes remained relatively low in both years.
- The heat map indicates a concerning trend of escalating hate crimes across the majority of precincts from 2019 to 2020, potentially reflecting broader societal tensions or issues during that period.
- The variation in the number of hate crimes across different precincts (second heatmap) correlates with the low correlation between precinct code and other variables in the correlation heatmap.
- The insights from the correlation heatmap, showing weak correlations for most variables, suggest that interventions should be highly focused on specific precincts with historically higher rates of hate crimes.

10. Violin Plot: Distribution of Hate Crimes Across Bias Motives Over the Years

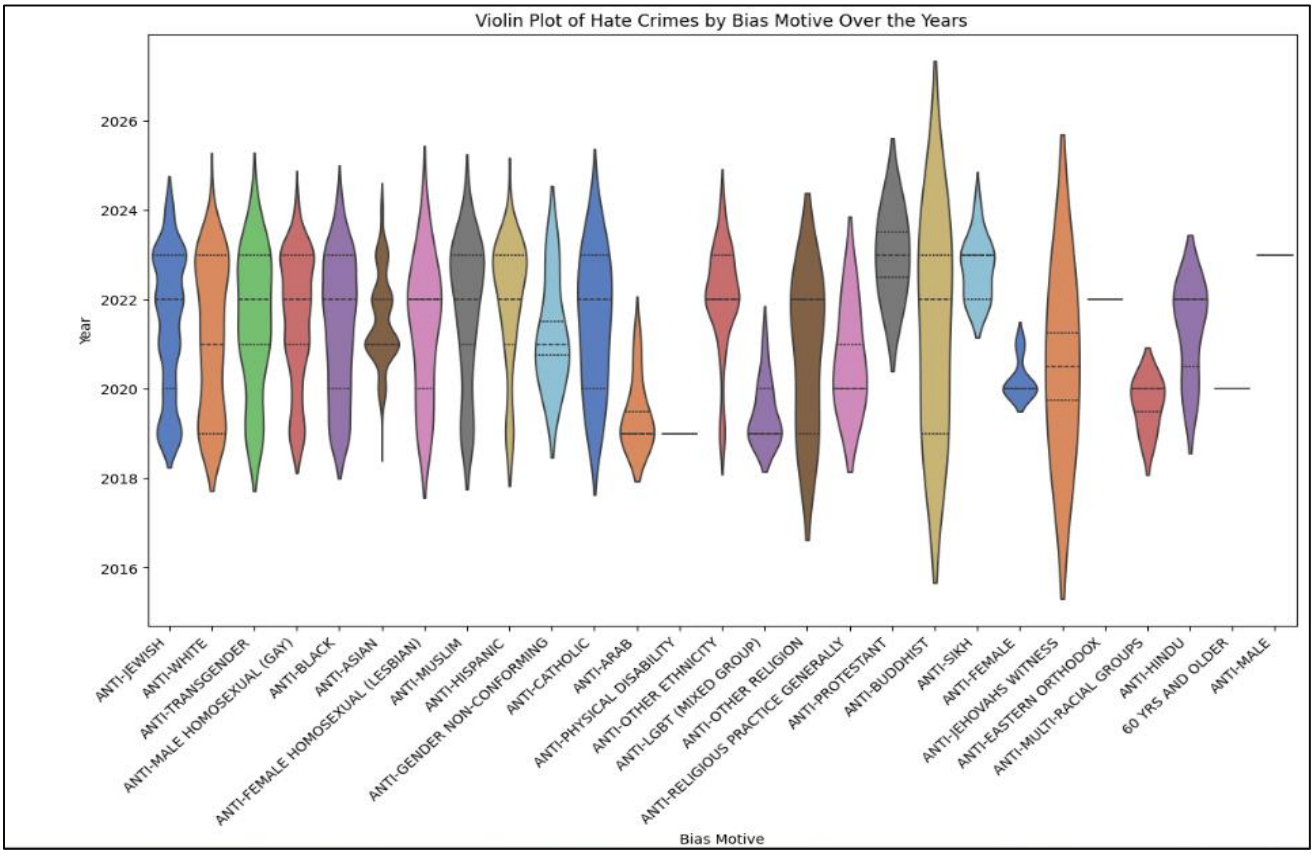

Figure 17: Distribution of Hate Crimes Across Bias Motives Over the Years

Insights: Here are some insights from the Violin plot (*Figure 17*):

- The bias motives with the highest frequency of hate crimes appear to be anti-Black or African American, anti-White, anti-Hispanic or Latino, and anti-Jewish.
- There is a wide variation in the frequency of hate crimes across different bias motives, with some motives having very high peaks while others have relatively lower occurrences.
- The distribution of hate crimes for most bias motives appears to be skewed, with a few outliers or extreme values driving the higher end of the distribution.
- There are multiple biased motives represented, indicating that hate crimes can be motivated by various factors such as race, ethnicity, religion, sexual orientation, and others.
- The overall pattern suggests that hate crimes motivated by different biases have been persistent over the years, with some motives being more prevalent than others during certain periods.

11. Scatter Plot: Number of Incidents Per Month

Insights: The scatter plot (*Figure 18*) shows the number of hate crime incidents per month from 2019 to 2024, with each year represented by a different color.

- Yearly Distribution:
  - 2019 (dark blue): Incidents are spread consistently throughout the year.
  - 2020 (light blue): Slightly fewer incidents compared to 2019, but still evenly distributed across the months.
  - 2021 (lighter blue): Incidents increase slightly from 2020, maintaining an even distribution.

- 2022 (peach): The number of incidents continues to rise, showing a consistent monthly distribution.
- 2023 (light red): Further increase in incidents, maintaining an even spread throughout the year.
- 2024 (dark red): Despite a drop in overall incidents compared to previous years, the distribution remains relatively even across months.

- Monthly Patterns: There are no significant spikes or drops in hate crime incidents in specific months. Each year shows a relatively even spread of incidents across all months, indicating no particular month stands out as having a significantly higher or lower number of incidents.
- Trend Over Time: From 2019 to 2023, there is a clear upward trend in the number of incidents, with each subsequent year showing more incidents than the previous year.
- In 2024, there is a notable decrease in the number of incidents compared to 2023, yet the distribution across months remains uniform.
- Uniformity: The plot highlights a uniform distribution of incidents each year, suggesting that hate crimes do not significantly fluctuate by month within each year.

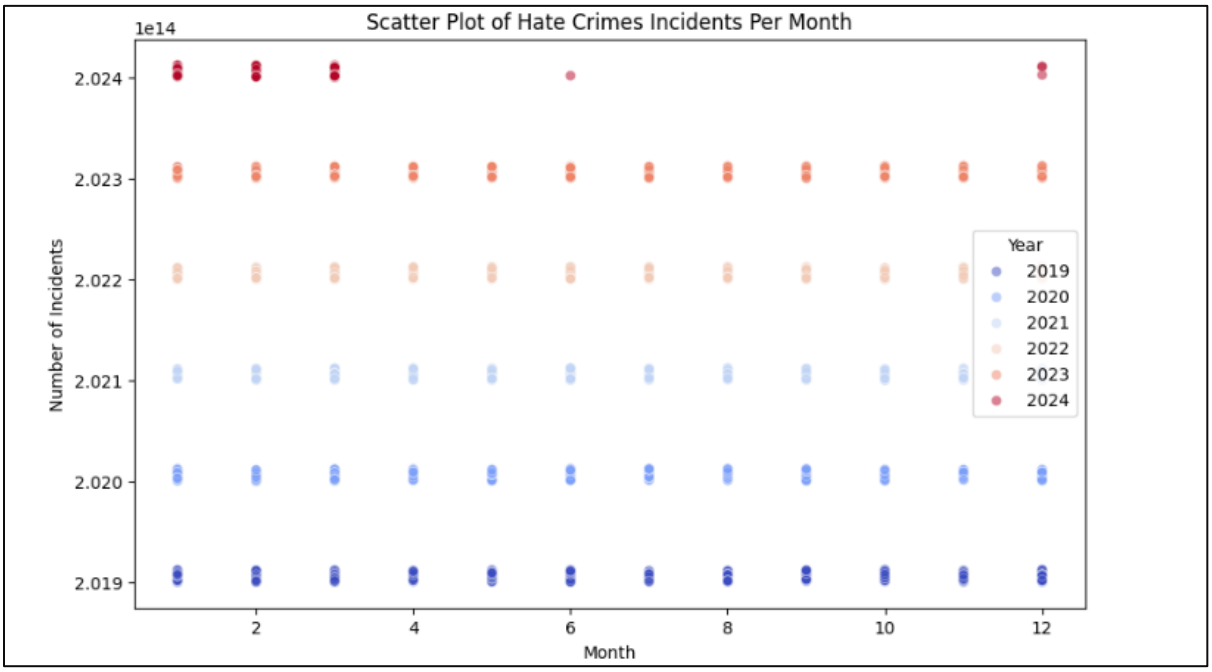

Figure 18: Number of Incidents Per Month

12. Line Plot – Number of Incidents vs. Number of Arrests

Insights:

- The line plot (*Figure 19*) illustrates the number of hate crime incidents and arrests over the years from 2019 to 2024.
- **Trend in Incidents**: There is a noticeable increase in the number of incidents from 2020 to 2023, peaking in 2023. However, there is a sharp decline in incidents in 2024.
- **Trend in Arrests**: The number of arrests gradually increased from 2020, reaching a peak in 2023, before also experiencing a sharp decline in 2024.
- **Comparison**: The number of incidents consistently exceeds the number of arrests each year. However, the gap between incidents and arrests appears to be narrowing over time, especially from 2021 to 2023, indicating a potentially improved law enforcement response in terms of making arrests relative to the number of incidents reported.

- **Significant Changes in 2024**: Both incidents and arrests show a significant drop in 2024, which could be due to various factors such as changes in reporting practices, law enforcement policies, public awareness, or actual decreases in hate crime activities.
- Both images indicate a peak in hate crime incidents in 2023. This could be due to various factors including socio-political events, increased reporting, or hate crime activity increases.
- The correlation between high incident rates and higher arrest rates in 2023 suggests a responsive law enforcement presence during that year.
- The consistent rise in incidents until 2023 followed by a sudden decline in 2024 warrants further investigation into the causes and effectiveness of interventions.

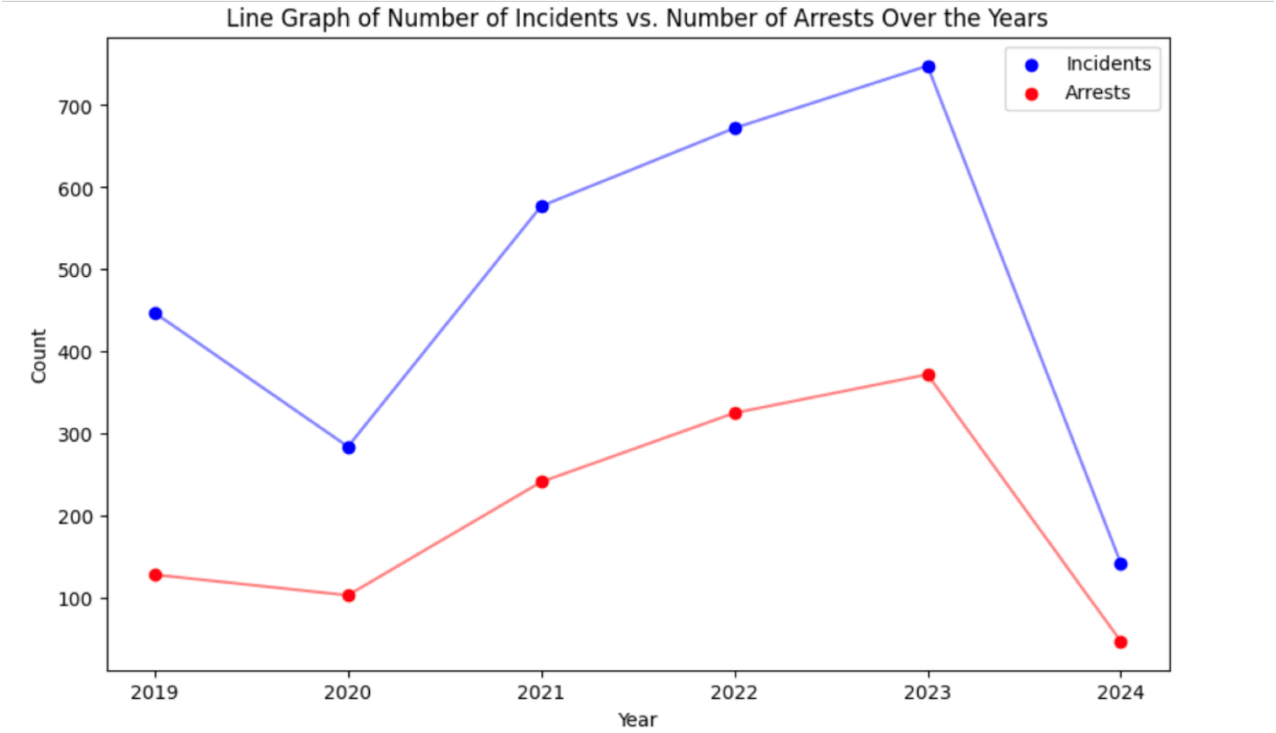

Figure 19: Number of Incidents vs. Number of Arrests

Inferences and Conclusion

- **Trends Over Time**: Hate crime data reveals distinct year-over-year patterns, with certain years experiencing an increase in incidents. These spikes may be linked to socio-political events or heightened awareness and reporting among the public.
- **Seasonality**: Monthly analysis indicates a potential seasonal component to hate crimes, with some months consistently showing higher incident rates. This calls for a deeper investigation into the seasonal factors driving these crimes.
- **Borough-Specific Patterns**: The distribution of hate crimes varies significantly across boroughs, emphasizing the need for localized crime prevention strategies and community engagement initiatives.
- **Bias Motives**: Hate crimes motivated by race, religion, and sexual orientation are particularly prevalent. This underscores the importance of targeted educational and outreach programs to promote understanding and tolerance.
- **Law Code Categories**: Examining hate crimes by legal categorization (felony, misdemeanor, etc.) provides insights into the severity of incidents, aiding in the allocation of legal and judicial resources.
- **Cluster Analysis**: Hierarchical clustering heatmaps show the frequency of hate crime complaints across different precincts and offense categories, helping guide the strategic deployment of law enforcement resources.

- **Violin and Box Plots**: These plots illustrate the distribution and density of hate crimes across different boroughs and months. They suggest that while certain areas and times are more susceptible to incidents, the issue is widespread and requires citywide attention.

Conclusions: The analysis of the NYPD hate crime dataset underscores the need for continuous monitoring of hate crime trends to facilitate timely policy and law enforcement responses. Educational initiatives should be intensified in months and boroughs with high hate crime rates to address underlying biases. Law enforcement agencies can leverage these insights to optimize patrol schedules and enhance community engagement, ensuring a more effective and localized response to hate crimes.

References

[1] NYPD Hate Crimes Data (Dataset) [*Online*] – Available: https://catalog.data.gov/dataset/nypd-hate-crimes

[2] NYPD, "What is a Hate Crime/Bias Incident?", New York City Police Department [*Online*] – Available: https://www.nyc.gov/site/nypd/services/law-enforcement/hate-crimes.page