Chicago Crime Data Visualization

Final Report

Fall 2023

Team Not Slytherin!

Team Members:

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Abstract:

The focus of the Chicago Crime Data Visualization is on utilizing data visualization methods to uncover valuable insights from crime data in the city of Chicago. Our objective is to empower decision-makers, reveal intricate patterns and trends, engage the community, and most importantly, implement data-driven strategies to enhance safety and, importantly, improve the existing Data Visualization projects that happen to be available through the analysis and visualization of this data. The ability to extract actionable insights from crime data through visualization presents a powerful opportunity for more effective allocation of resources and the development of policies. This project, which is built on earlier work in the field, intends to broaden our understanding of crime patterns, identify crucial areas for intervention, and support collaborative efforts to make neighborhoods safer. This project aims to showcase the potential of this area in addressing complex societal issues and moving Chicago closer to becoming a safer and more secure city.

Citations:

Department, C. (Ill.). P. (2019) *Chicago Crimes, 2001-2018*. Available at: https://doi.org/10.3886/ICPSR37256.v1 (Accessed: 10 December 2023).

ILLINOIS CRIMINAL JUSTICE INFORMATION AUTHORITY -

Illinois Criminal Justice Information Authority (no date) ICJIA. Available at: https://icjia.illinois.gov/researchhub/articles/criminal-history-records-check-for-federally-assisted-housing-applications--state-fiscal-year-2023-annual-report/ (Accessed: 10 December 2023).

Introduction:

The city of Chicago, like many urban cities, struggles with a diverse range of crimes that impact its residents and communities. This study dives into a comprehensive analysis and data visualization of crime incidents in Chicago, aiming to find patterns, trends, and potential correlations. Leveraging a rich dataset of crime records, this research applies data visualization tools to provide a deeper understanding of crime dynamics within the city. The insights obtained from this analysis are crucial for informing policy decisions, improving public safety strategies, and fostering a safer urban environment.

Motivation:

Crime is a big problem in cities, especially in cities like Chicago, affecting the safety of residents. The motivation for this project comes from the imperative need to enhance urban safety and the quality of life for Chicago's residents to get an idea on which neighborhood locations are best to live. By visualizing crime data will help residents of Chicago identify trends and hotspots and holistically analyzing crime data allow us to identify the areas prone to criminal activities, enabling targeted law enforcement efforts, inform policy decisions and resource allocation. As a result we can engage the community and empower them to address crime challenges. This will also ensure transparency in reporting and promote trust and accountability.

Existing and Relevant work:

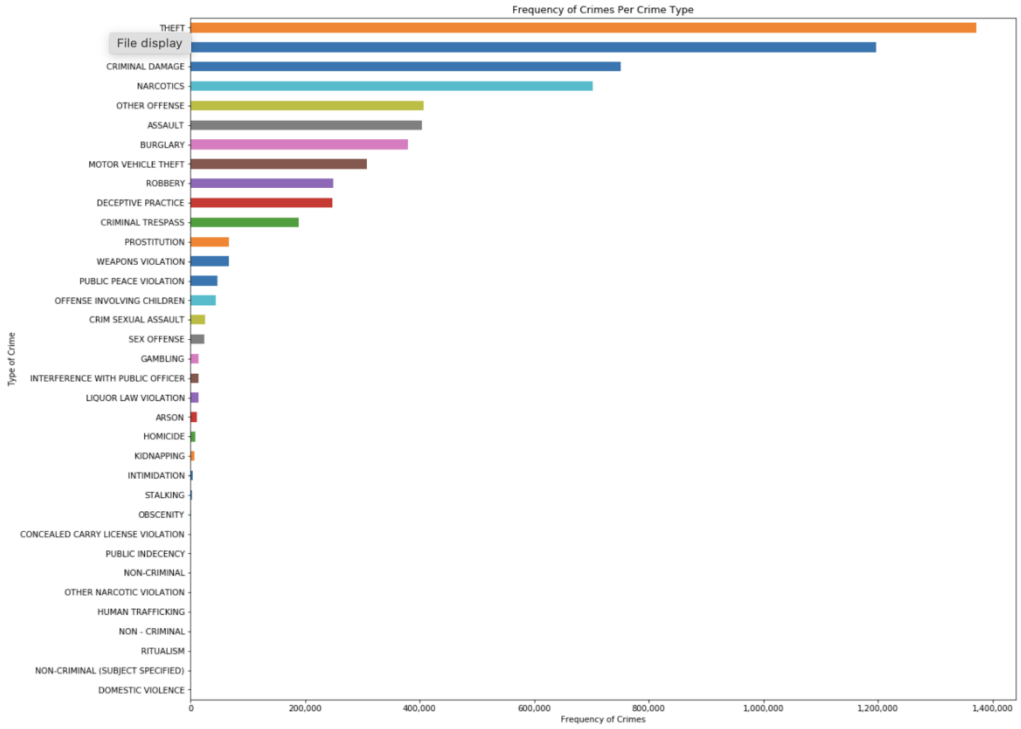
A lot of research has been devoted to analyzing crime data using various visualization techniques. Existing visualizations often employ heatmaps, bar and histograms, and time series plots to portray crime density, and trends over time. However we believe these visualizations can be further enhanced for a more intuitive and comprehensive understanding of crime dynamics in Chicago. Below are the used references along with substantive critiques about them;

Link- for existing visualizations -

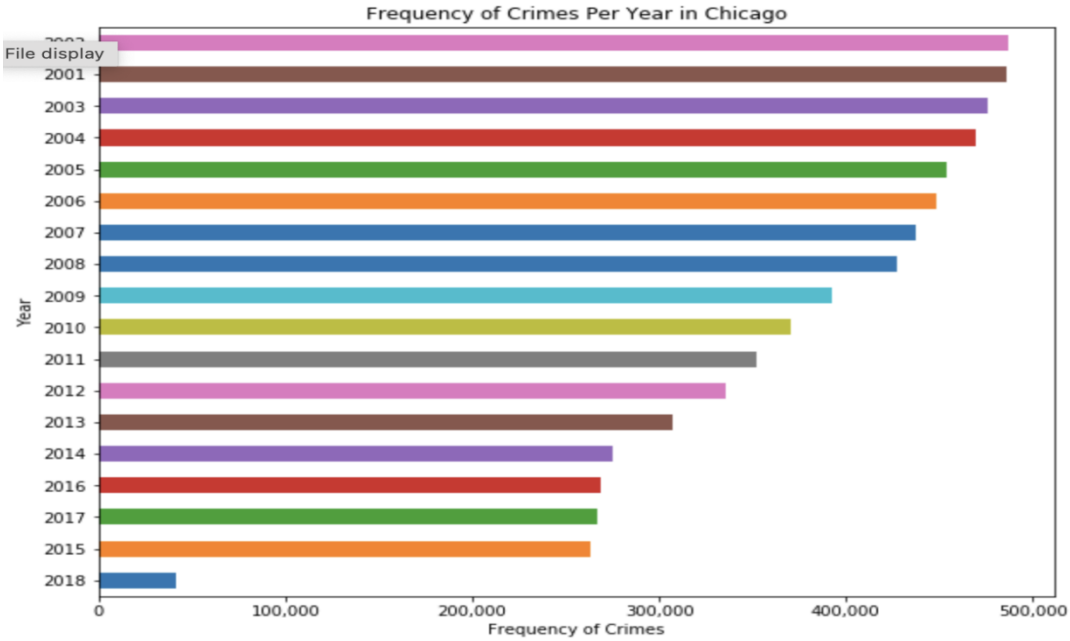
1. https://rstudio-pubs-static.s3.amazonaws.com/502626_3affbc5d29ea4dca8f8b3cde5549ffc0.html
2. https://www.kaggle.com/code/txp142130/utd-crimes-in-chicago-with-choropleth-map
3. https://public.tableau.com/app/profile/chicagodataviz/viz/ChicagoCrimeData/Summary

GitHub-My-Machine-Learning-Projects-CT/chicago-crime-data-analysis:

- **Overview:** This GitHub repository appears to contain a data analysis project on Chicago crime data from 2001 to the present. While it does not directly provide visualizations, it likely includes code and analysis related to crime data.
- **Existing Visualizations:**
    1. The below visualization tells us about the Frequency of crime happening in Chicago from the year 2001-2008. This is a bar chart and helps us understand the dynamics of crimes in Chicago, this helps us get an idea of the overall crime situation.

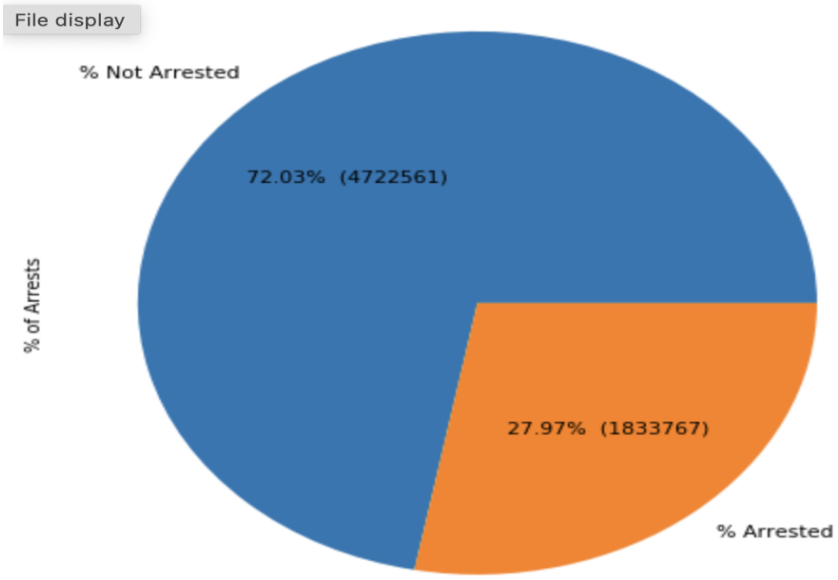


2. The next visualization is about the frequency of crimes per year in Chicago, this bar plot tells us the crime distribution across the years from 2001-2018. This is a helpful plot which we have also used in our visualizations to make you understand the change in overall crime in Chicago from 2001-present.



3. This next visualization is a pie chart which is used in this existing work which shows the percentage of arrests that happened and also which were

unsuccessful. This is important information, but could have been visualized better in order to get more information from it, and we have done that in our current project, and visualized this better.

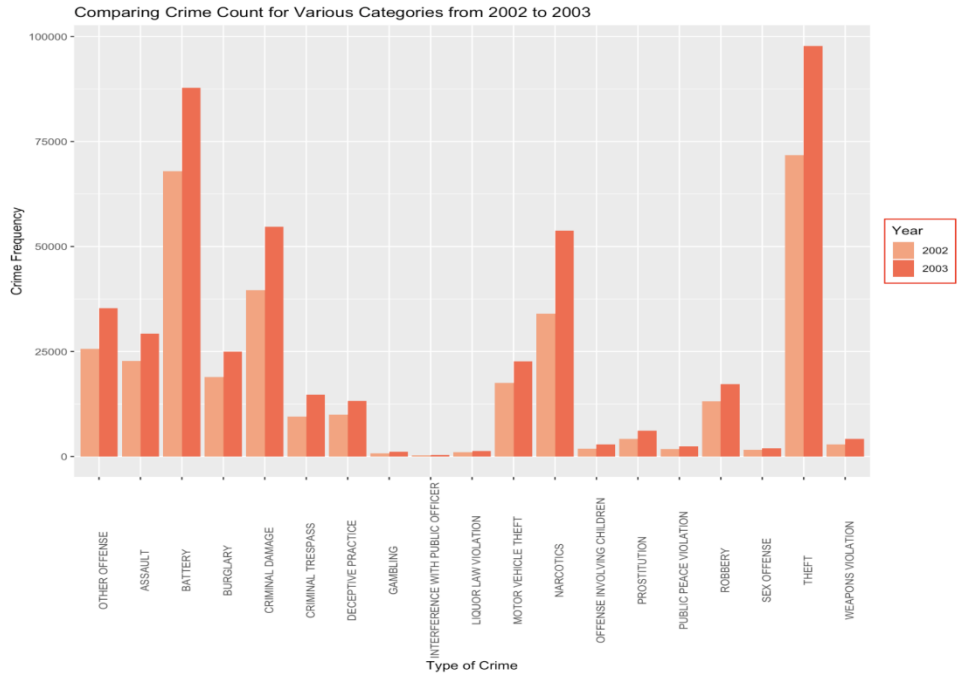


- **Critique:** It's essential for such projects to offer clear explanations of the analysis, methods, and findings to make them accessible and informative to a wider audience.

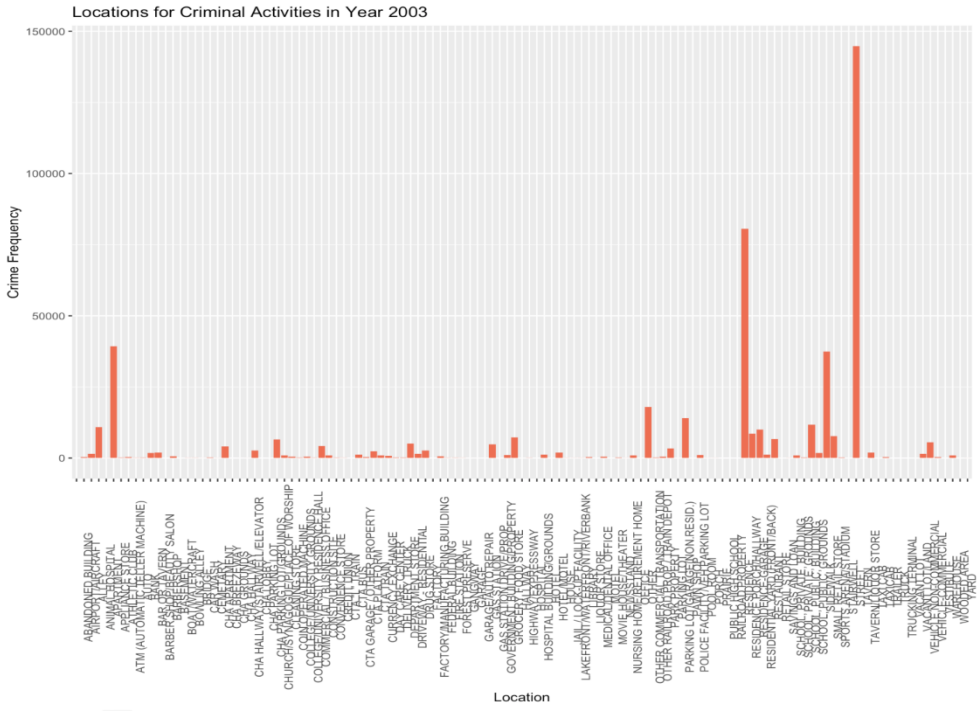
Exploratory Analysis of Chicago Crime Data in the Period, 2001 through 2018:

- **Overview**: This publication seems to present an exploratory analysis of Chicago crime data spanning from 2001 through 2018.

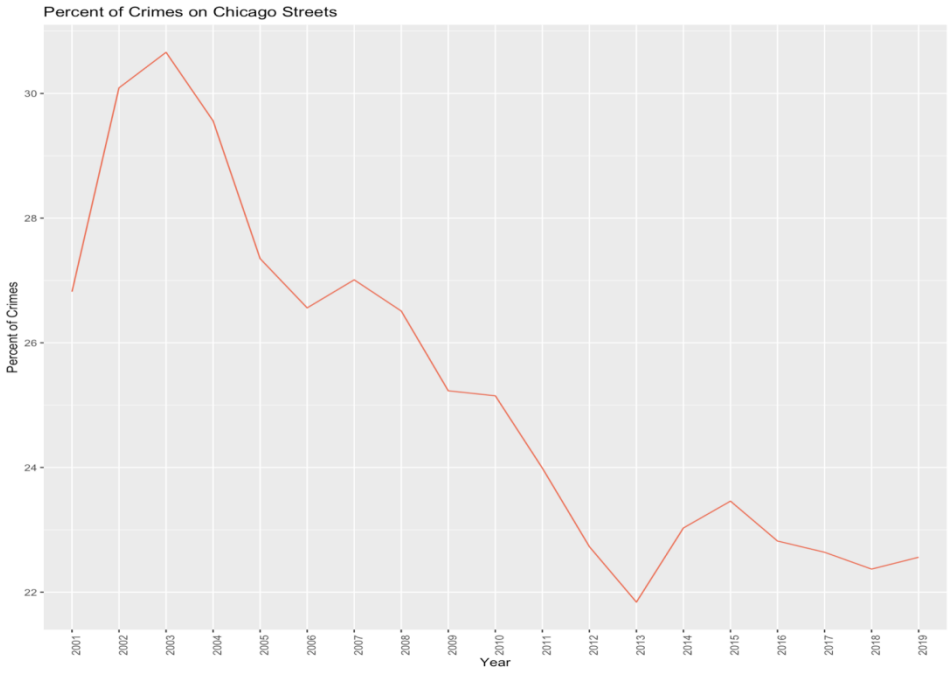
- **Existing Visualizations:**
    1. In this existing work, we could find the similar visualizations of the overall dynamics of crime in Chicago for the given time period and comparison of crimes that happened in two consecutive years, which could be seen in the below image.



2. Another visualization is about the notorious locations where the crimes happen, but it looks a little clumsy and not readable. So, I have worked on this as well and tried to show it in a better way. Below is the visualization for this existing work.



3. One visualization which we think helped us and remained constant throughout these years was this trend pattern of crime decreasing over the years, though its a simple visualization, it gives a very good insight and information which we have also tried to show from the year 2019 - 2023. Below is that visualization from the existing work.



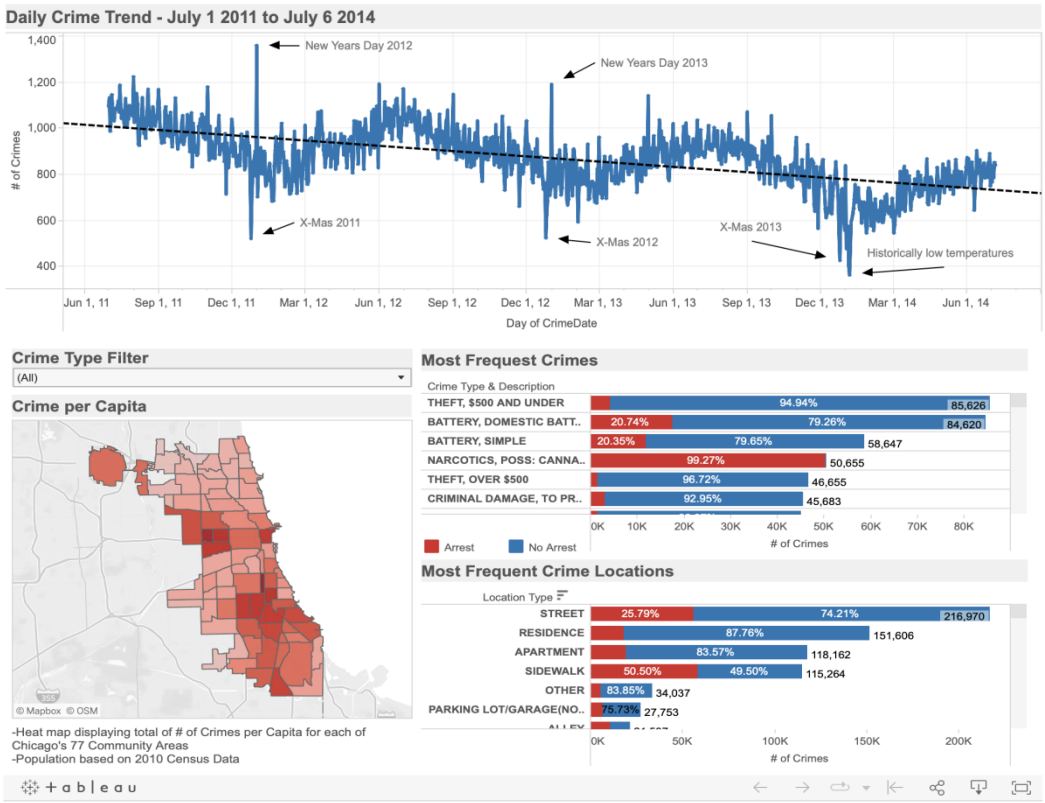
- **Critique:** If the analysis was well-documented, it could have been a valuable resource for understanding long-term crime trends in Chicago.

Chicago Crime Scene (#VOTD) and Chicago Crime Data by Reynolds, Sean:

- **Overview:** These Tableau visualizations titled "Chicago Crime Scene" and "Chicago Crime Data" likely provide insights into Chicago crime data.

- **Existing Visualizations :**
    1. This existing work is a tableau dashboard with a live interactive map, which was really amazing and very responsive but was limited to parameters. We

tried to do something similar but in jupyter notebook itself where we also created an interactive dashboard kind of a page which is a time series analysis of crimes against different parameters like district, time of the crime, etc. Below are the images from the existing work.



- **Critique:** Unfortunately, these links provided lead to a Tableau page that doesn't provide a comprehensive review, it would be necessary to evaluate the visualization's effectiveness in conveying crime patterns and trends. The availability of interactive features and user-friendliness can greatly impact its utility.

Contribution:

The existing visualizations don't cover our main motive on observing trends over pre,during and post covid seasons. We aimed at developing geospatial maps like a dot-distribution map, choropleth map, heatmap. Along with these our aim is to show trends and compare a particular type of crime from the three different covid eras we discussed above. By this we can clearly

observe how the crime changed in recent years and did covid help or neutral or increase the crime rate and its correlation to safety of Chicago citizens.

Along with some directly hitting(static) visualizations on selected variables to answers our questions, we are also interested in having an interactive visualization which users can compare like type of crimes over years with other variables present in our dataset like location, ward, time of day at which a crime happens and day of the week.

Data & Methods: ideas, sketches, prototypes: (**lays out the core ideas clearly (in the context of contribution), provides sketches and prototypes and explains each part of the visualization design in detail.**)

Link to data: https://data.cityofchicago.org/Public-Safety/Crimes-2001-to-Present/ijzp-q8t2/about_data

The data description is as follows:

Description of Columns:

Column Name	Description	Type
ID	Unique identifier for the record.	Number
Case Number	The Chicago Police Department RD Number (Records Division Number), which is unique to the incident.	Plain Text
Date	Date when the incident occurred. This is sometimes a best estimate.	Date & Time
Block	The partially redacted address where the incident occurred, placing it on the same block as the actual address.	Plain Text
IUCR	The Illinois Uniform Crime Reporting code. This is directly linked to the Primary Type and Description. See the list of IUCR codes at https://data.cityofchicago.org/d/c7ck-438e.	Plain Text
Primary Type	The primary description of the IUCR code.	Plain Text
Description	The secondary description of the IUCR code, a subcategory of the primary description.	Plain Text

Location Description	Description of the location where the incident occurred.	Date & Time
Arrest	Indicates whether an arrest was made.	Checkbox
Domestic	Indicates whether the incident was domestic-related as defined by the Illinois Domestic Violence Act.	Plain Text
Beat	Indicates the beat where the incident occurred. A beat is the smallest police geographic area – each beat has a dedicated police beat car. Three to five beats make up a police sector, and three sectors make up a police district. The Chicago Police Department has 22 police districts. See the beats at https://data.cityofchicago.org/d/aerh-rz74.	Plain Text
District	Indicates the police district where the incident occurred. See the districts at https://data.cityofchicago.org/d/fthy-xz3r.	Plain Text
Ward	The ward (City Council district) where the incident	Number

	occurred. See the wards at https://data.cityofchicago.org/d/sp34-6z76.	
Community Area	Indicates the community area where the incident occurred. Chicago has 77 community areas. See the community areas at https://data.cityofchicago.org/d/cauq-8yn6.	Plain Text
FBI Code	Indicates the crime classification as outlined in the FBI's National Incident-Based Reporting System (NIBRS). See the Chicago Police Department listing of these classifications at http://gis.chicagopolice.org/clearmap_crime_sums/crime_types.html.	Plain Text
X Coordinate	The x coordinate of the location where the incident occurred in State Plane Illinois East NAD 1983 projection. This location is shifted from the actual location for partial redaction but falls on the same block.	Number

Y Coordinate	The y coordinate of the location where the incident occurred in State Plane Illinois East NAD 1983 projection. This location is shifted from the actual location for partial redaction but falls on the same block.	Number
Year	Year the incident occurred.	Number
Updated On	Date and time the record was last updated.	Date & Time
Latitude	The latitude of the location where the incident occurred. This location is shifted from the actual location for partial redaction but falls on the same block.	Number
Longitude	The longitude of the location where the incident occurred. This location is shifted from the actual location for partial redaction but falls on the same block.	Number
Location	The location where the incident occurred in a format that allows for creation of maps and other geographic operations on this data portal. This location is shifted from the actual location for partial redaction but falls on the same	Location

	block.	

- The sketches we discussed were like the dot-distribution map discussed in the class for the new-york taxi data in Module-12.
- Also we planned to visualize a choropleth map, line graphs to analyze crime trends over years.
- An attempt to heatmap.
- Bar plots and histograms

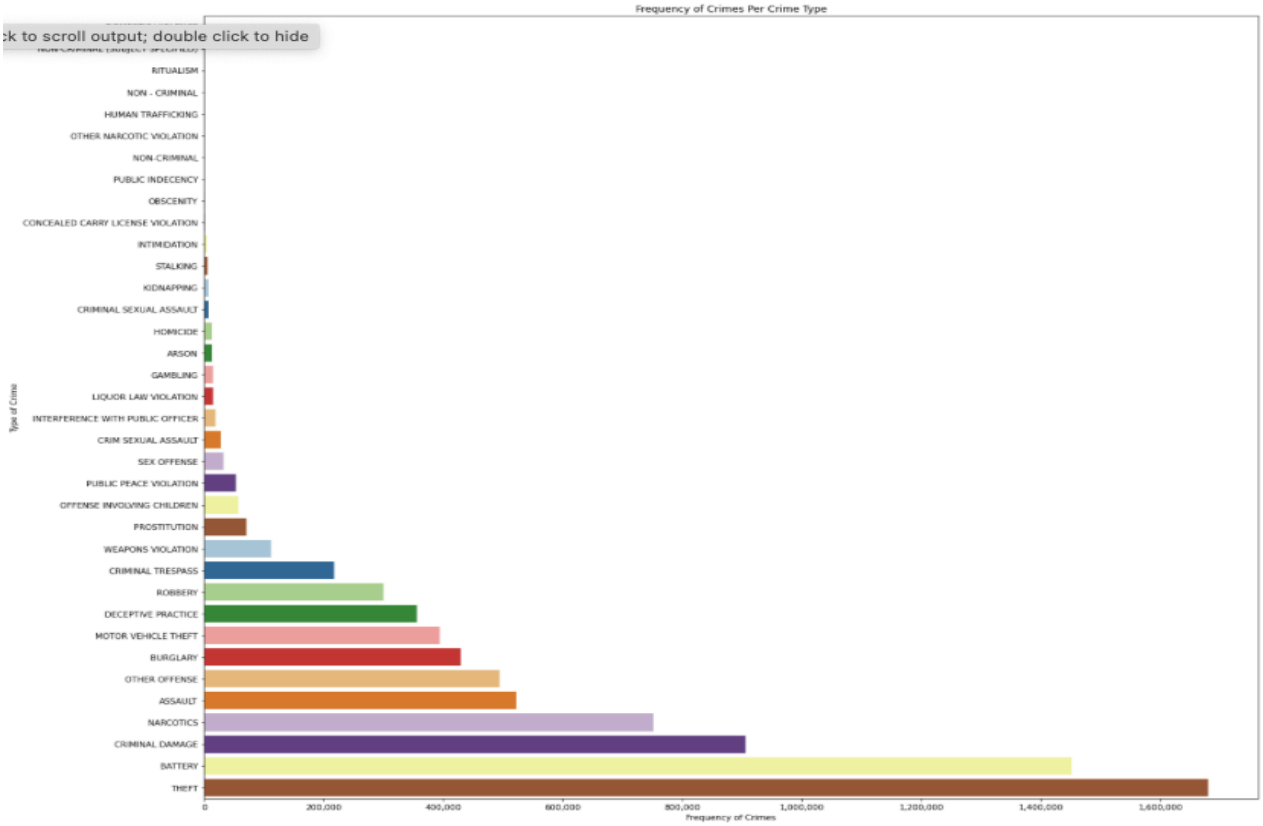
Data & Methods: visualization methods selection: (**Lays out potential candidate methods and discusses in detail what are the pros and cons and why a particular visualization is suitable or not.**)

Overall Stats

1. Bar Chart of Overall Frequency of Crime per Crime Type

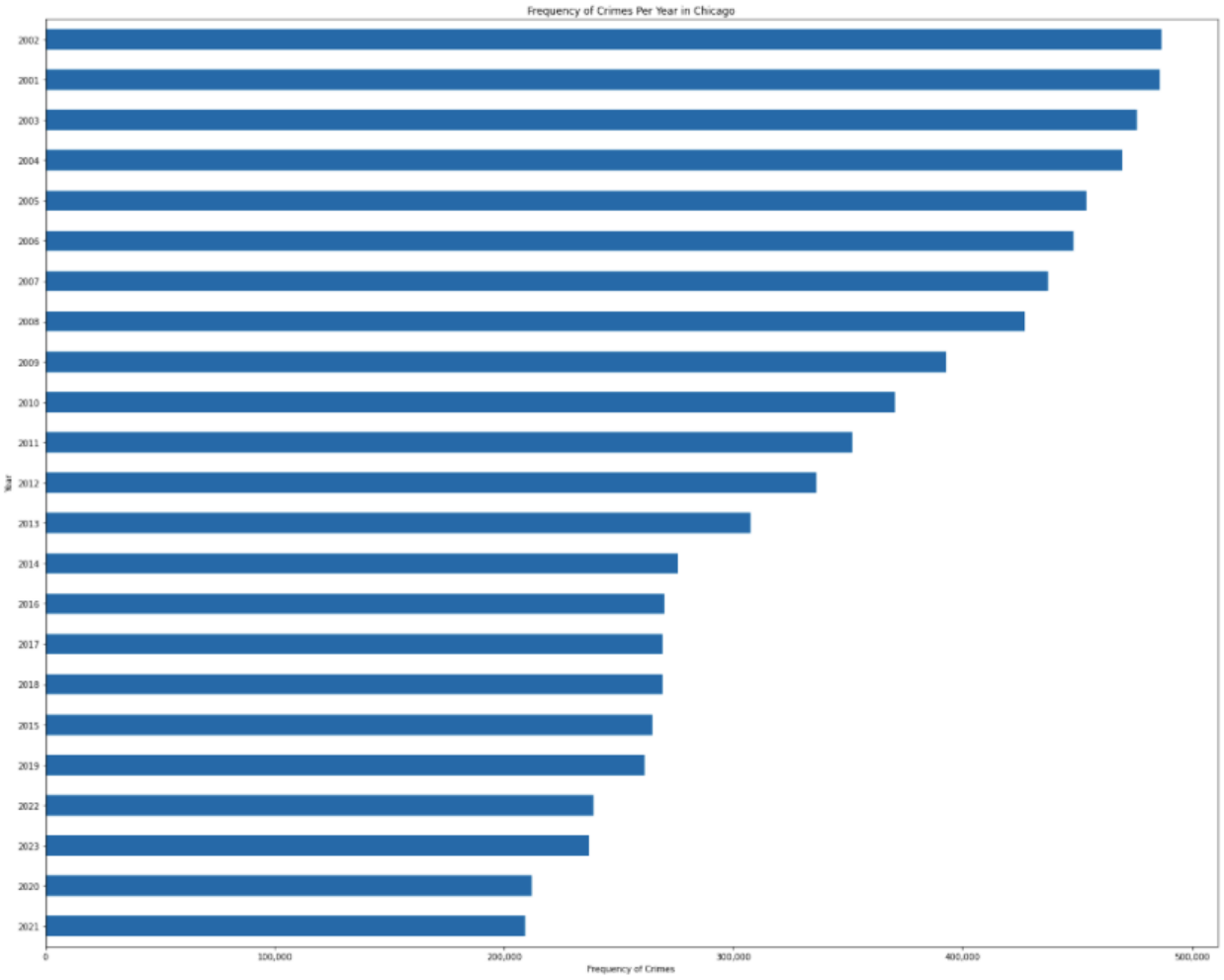
   In the below visualization we can see the total frequency of the crimes happened over the years and can see from the chart that the top three crimes are Theft, Battery

and Criminal damage. This trend has not changed since 2001 and ‘Theft’ continued to be the most occurring crime overall.



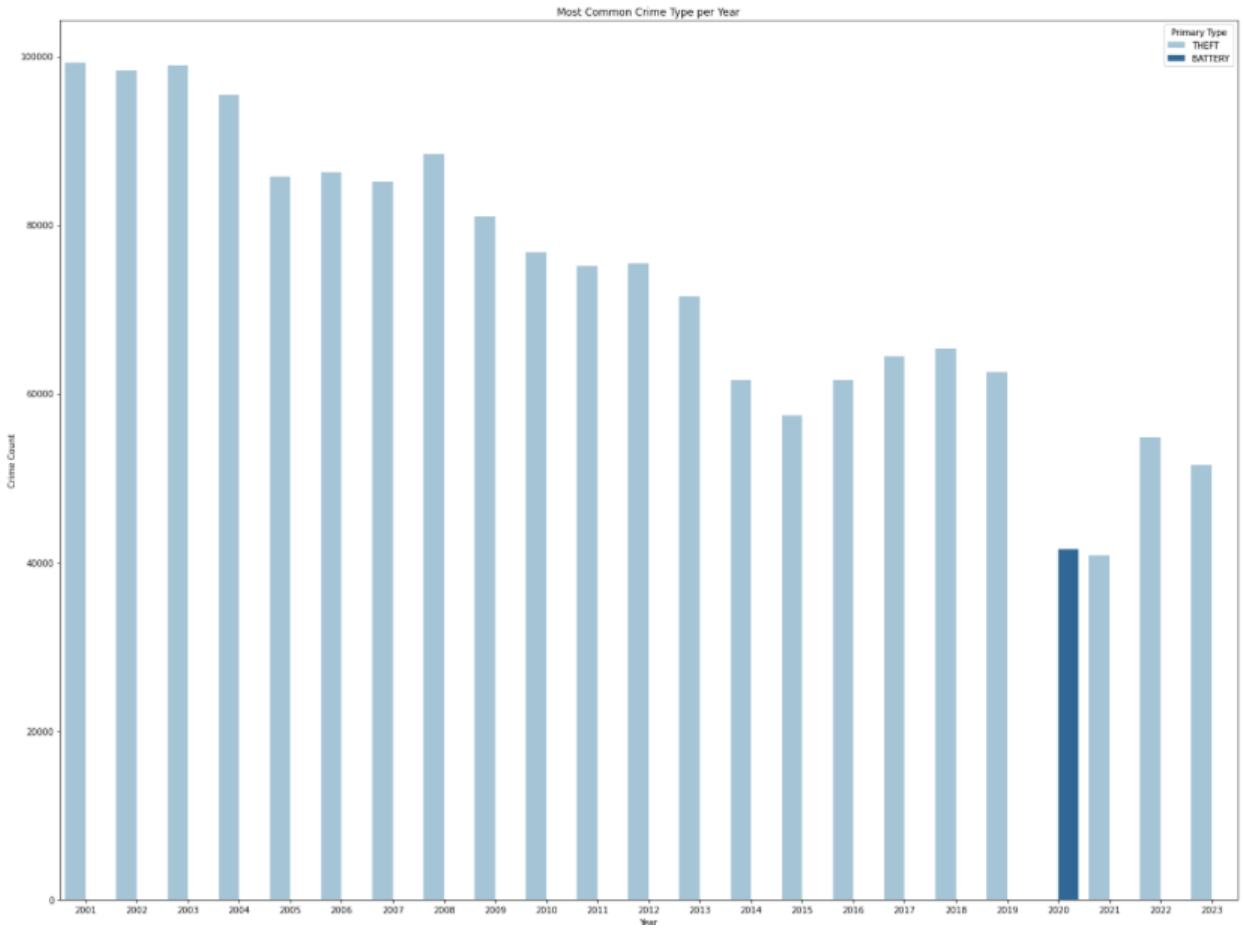
2. Bar Chart Of Frequency of Crimes per Year

In the below visualization we can see the distribution of frequency of crimes per year from 2001 - 2023. From this bar chart we can compare the rate of crime happening pre covid, during covid and post covid. This was also one of our main objectives to get patterns and trends for the covid years, which can be seen from this visualization. The trends we can draw from this graph is that during the covid years which were 2020 and 2021, the crime rate was at its least, and it increased again in post covid from the year 2022. This tells us that because of the covid pandemic there was a decline in crime rate.



3. Most Common Crime Type per Year

In this bar chart we see the most common crime over the years and their count as well. Clearly, from this graph it can be drawn that the two most common crimes are ‘Theft’ and ‘Battery’. And ‘theft’ was the most common crime over all the years except for the year 2020, which happened to be exactly the covid year. Here we can make a small insight or call it an assumption that since it was very difficult to people to move during that year, people couldn’t did a lot of ‘theft’, so, they went for the ‘battery’ which was one of the most possible crimes during that time for people to commit.



Visualization type-1 : Time series analysis and visualization for Chicago Crime data

Introduction

A comprehensive exploration and analysis of Chicago crime data, designed to explore crime trends over time: hourly, weekly, monthly and yearly rates and how the trends have changed with the Covid Pandemic.

We are presenting two stories that showcase the intensity of crimes:

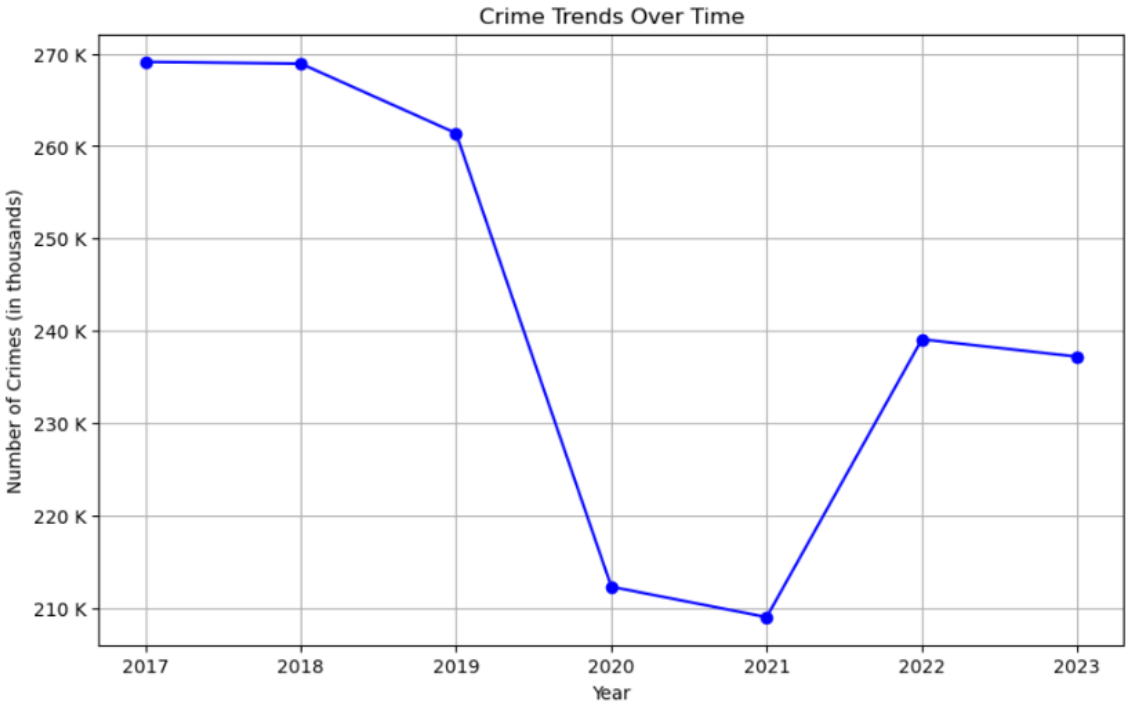
Story 1: Trends over Time

Story 2: Trends over Location

Both narratives are interwoven with the central theme: The Pandemic, presenting how the crimes have evolved over the pre-pandemic, pandemic and post-pandemic eras.

Story 1

Trends Over Time - Insights gained from the Static Visualization Plots



- The number of crimes increased steadily from 2017 to 2019.
- The number of crimes decreased significantly in 2020 and in 2021, during the COVID-19 pandemic.

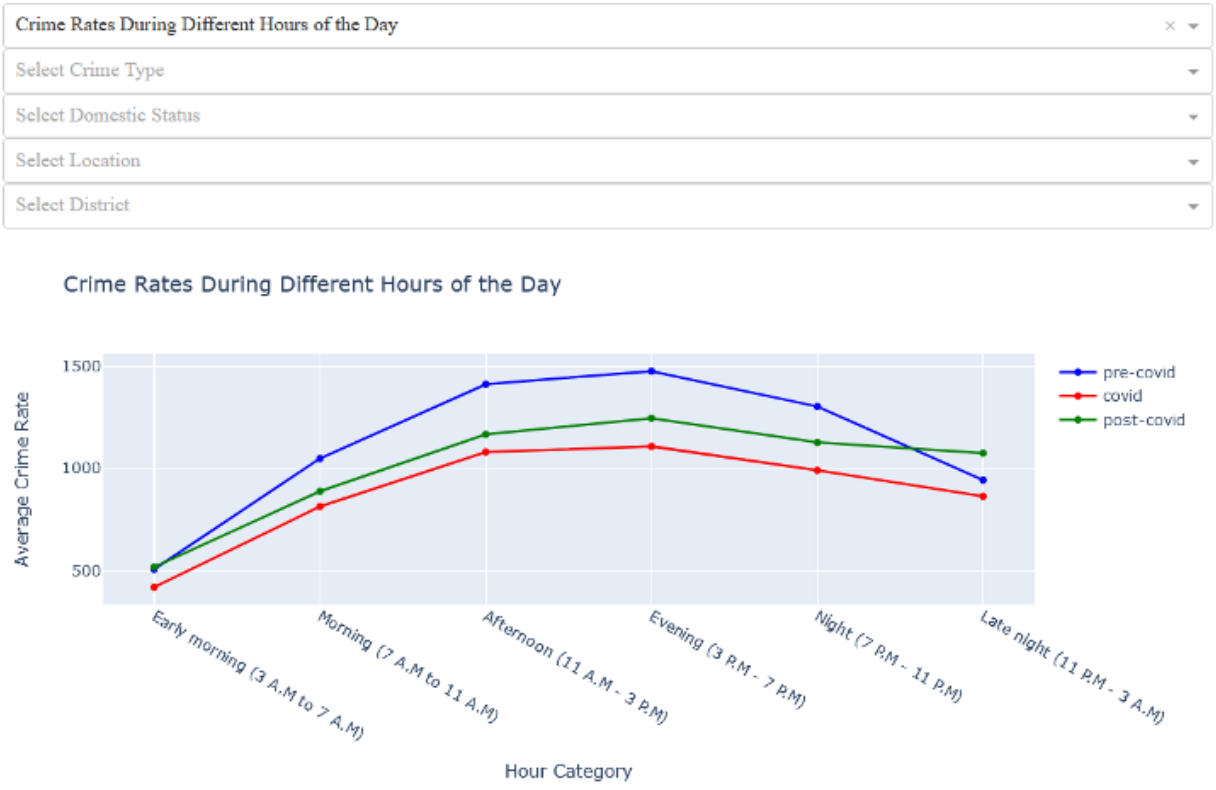
- The number of crimes has been increasing again since 2022, but not at the same rate as it was increasing before the pandemic.

Trends Over Time - Insights gained from the Interactive Visualization Plots

- These plots provide various options that the user can leverage to find deeper insights and discover patterns, trends in the dataset.
- The plot dynamically changes according to the selected parameters.
- It also has a hover tip that shows the data as you move the cursor.

Plot type 1: Crime Rates during different hours of the day

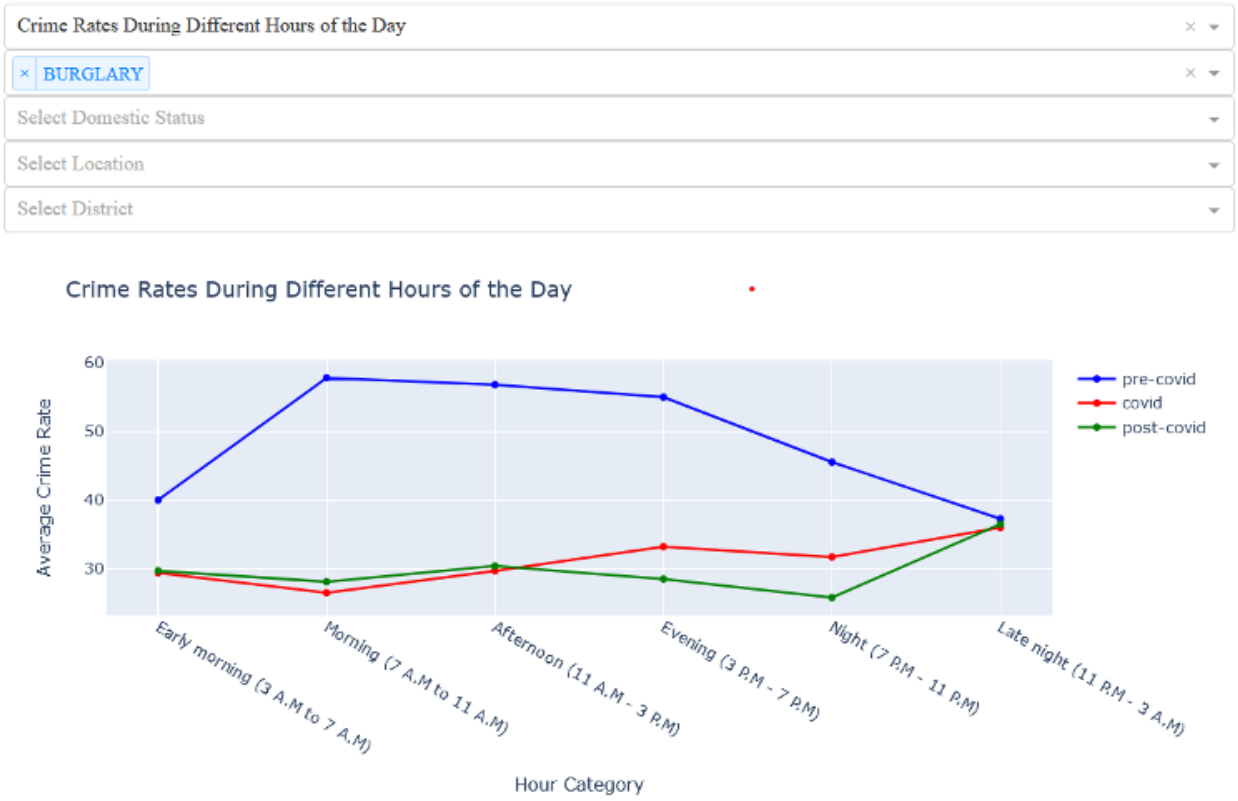
Categories chosen: None



- The crime rate is highest during the afternoon hours (11 AM - 3 PM) and the evening hours (3 PM - 7 PM), followed by the night hours (7 PM - 11 PM).
- The crime rate has increased during the afternoon and evening hours during all three periods: pre-COVID, during COVID, and post-COVID.

Categories chosen:

Crime type: Burglary

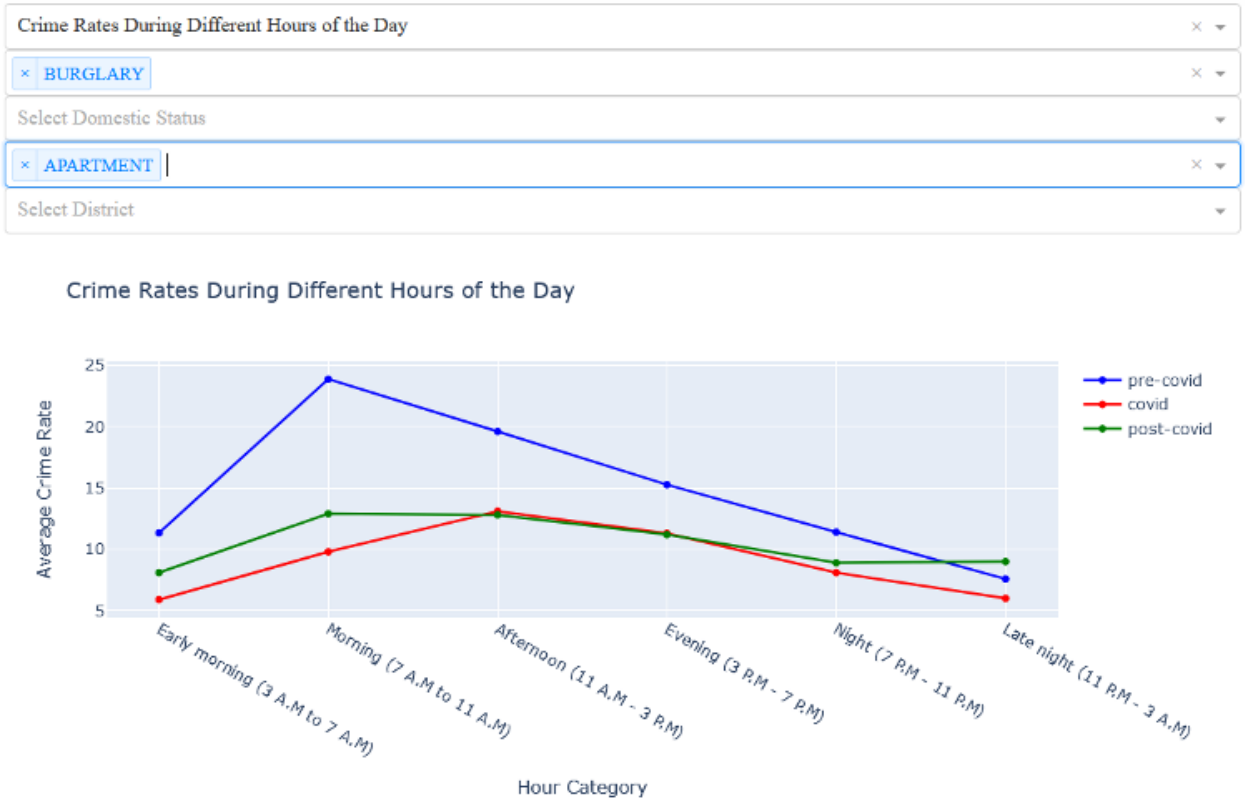


- Burglary has occurred at a high rate during morning, afternoon followed by evening hours during the pre-covid time.
- While it has drastically reduced during the covid and post-covid time.
- To investigate further let's check with the location description.

Categories chosen:

Crime type: Burglary

Location Description: Apartment

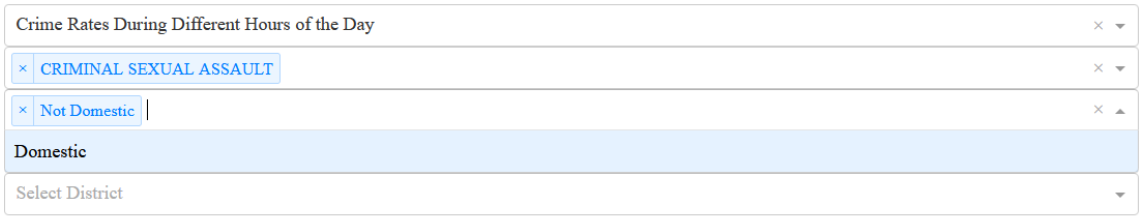


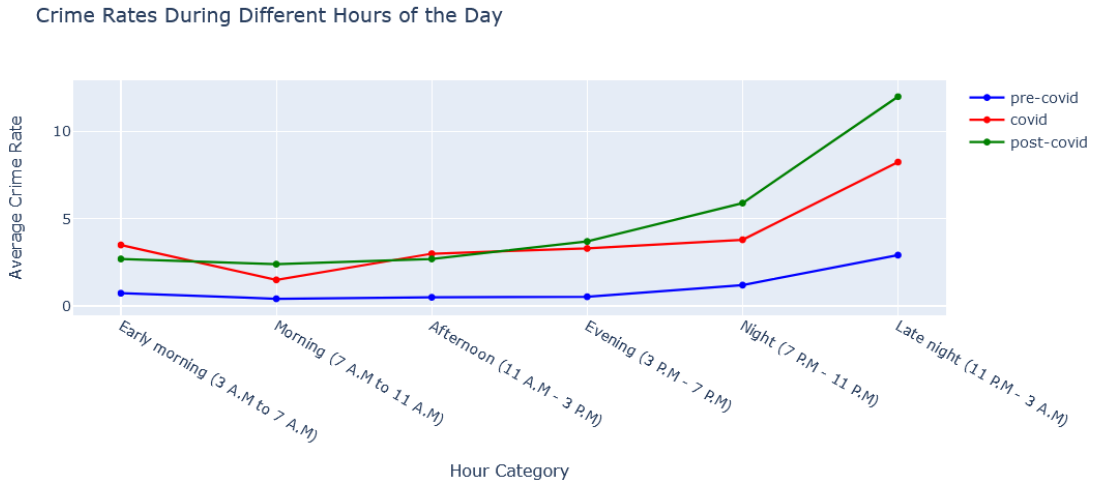
- This confirms our suspicions that the burglary rate at apartments have been highest during morning hours, followed by afternoon hours. Since, people might be outdoors during that time (Busy hours). But has significantly reduced during and after Covid, since people mostly stayed indoors during the pandemic and most resorted to “Work from Home” post Covid.

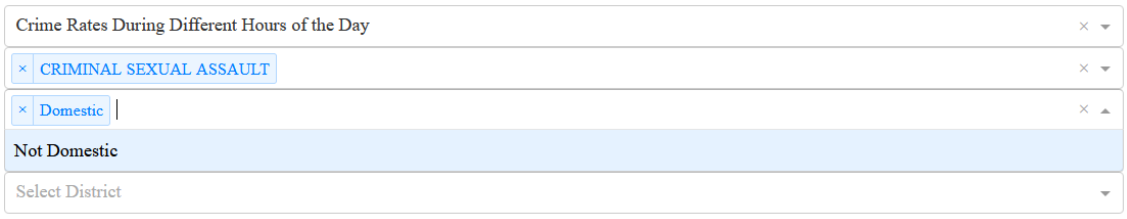
Categories chosen:

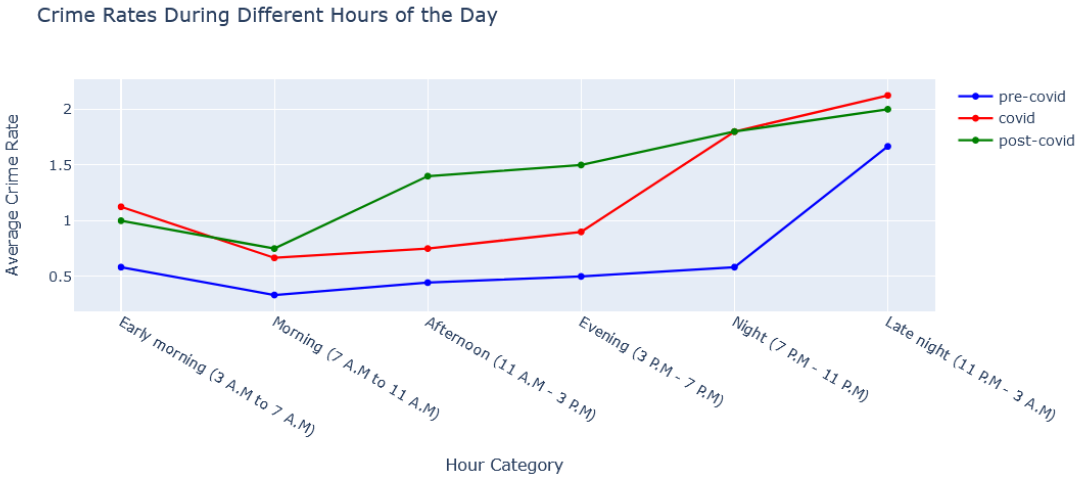
Crime type: Criminal Sexual Assault

1. Domestic
2. Not Domestic









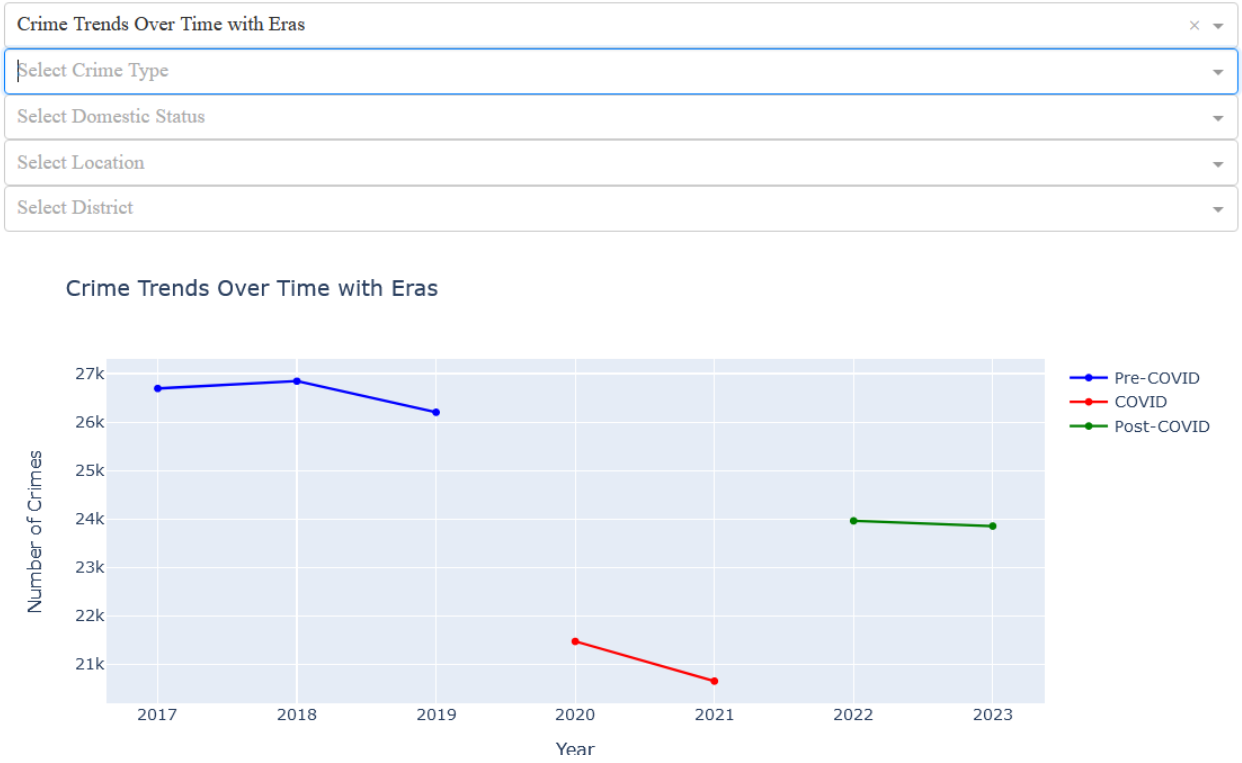
· Sexual assaults have occurred most during the late-night hours followed by the night hours.

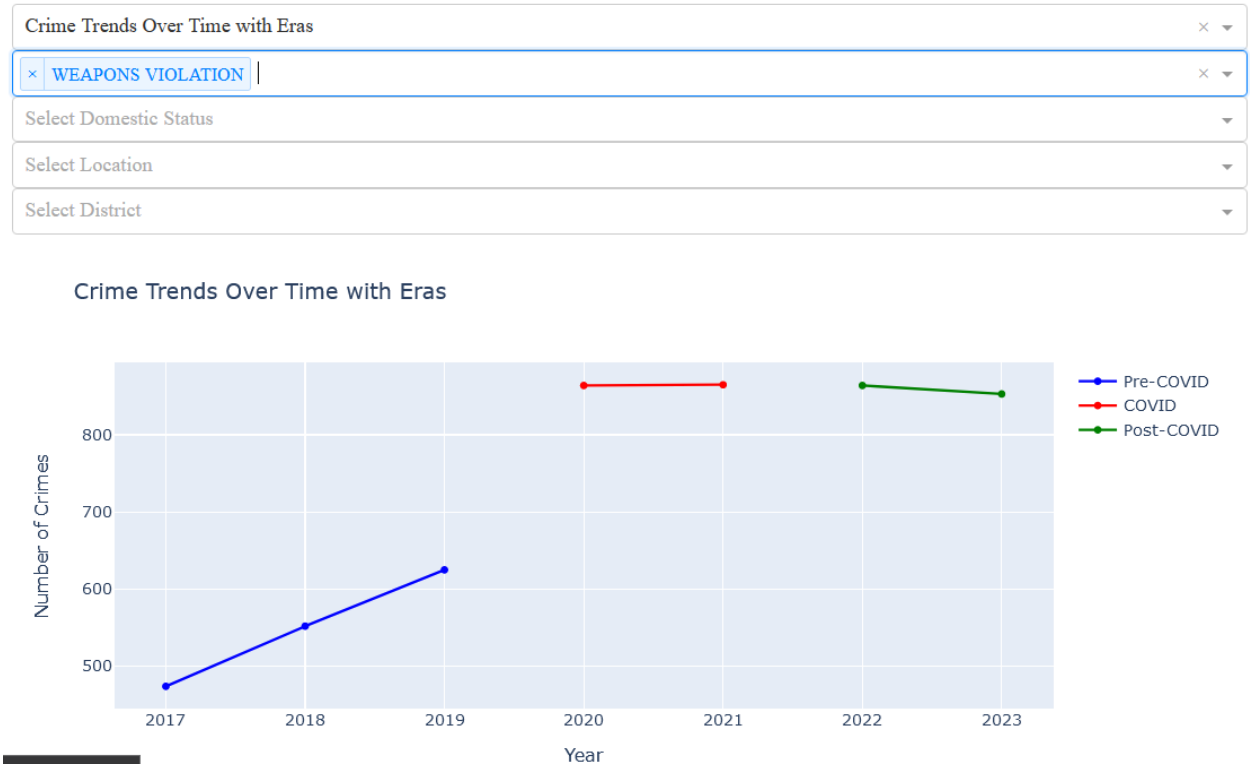
· Domestic sexual assaults have occurred less in number (y axis is different for both the graphs) than non-domestic assaults.
· Although the afternoon, evening, night hours have seen the same number of domestic sexual assaults.
· While predominantly the late night hours have been crime intensive time of the day for the non-domestic sexual assaults.

Plot type 2: Crime Trends over time with Eras

Categories chosen

Crime type: Overall Vs Weapons Violation



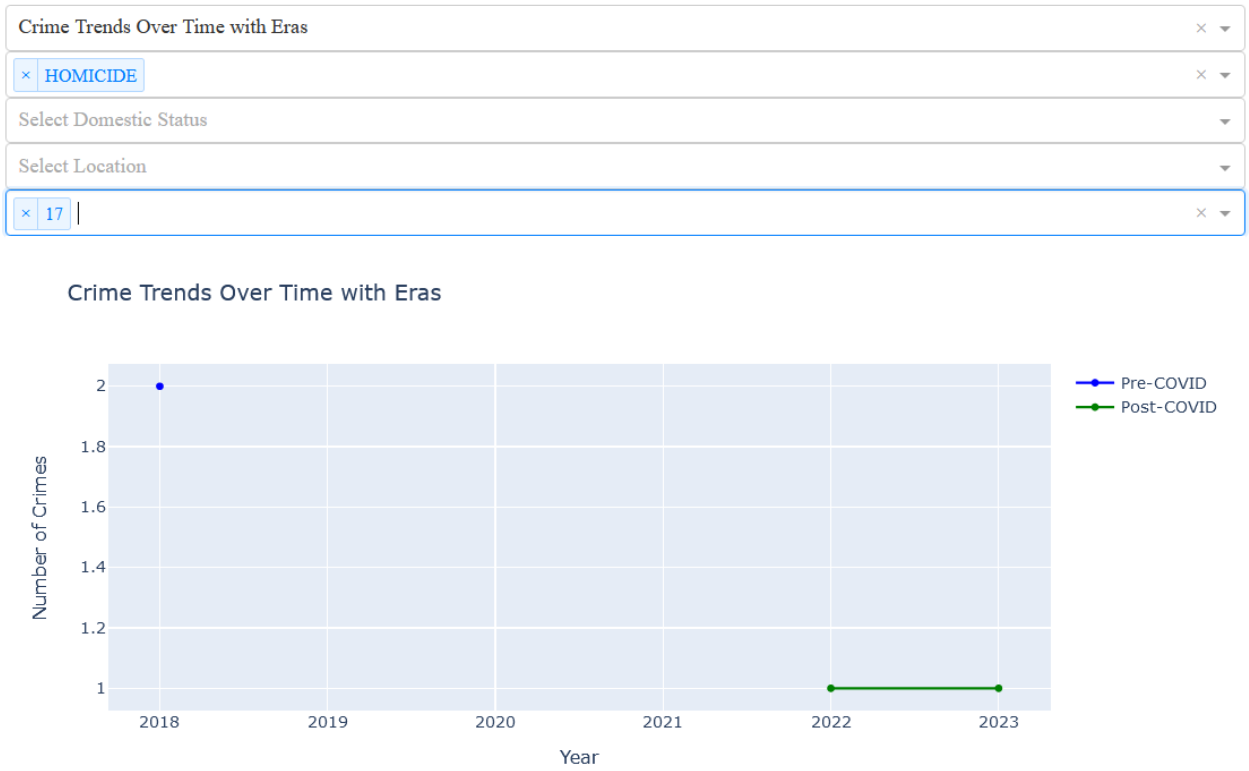


- Contrary to the overall crime trends over time with eras, where there is a significant drop in the overall crimes during Covid, this crime type: weapons violation has increased during the Covid and subsequently post Covid. (The y scale is quite different though). But it is interesting to note that this type of crime has increased during the Covid time.

Categories chosen

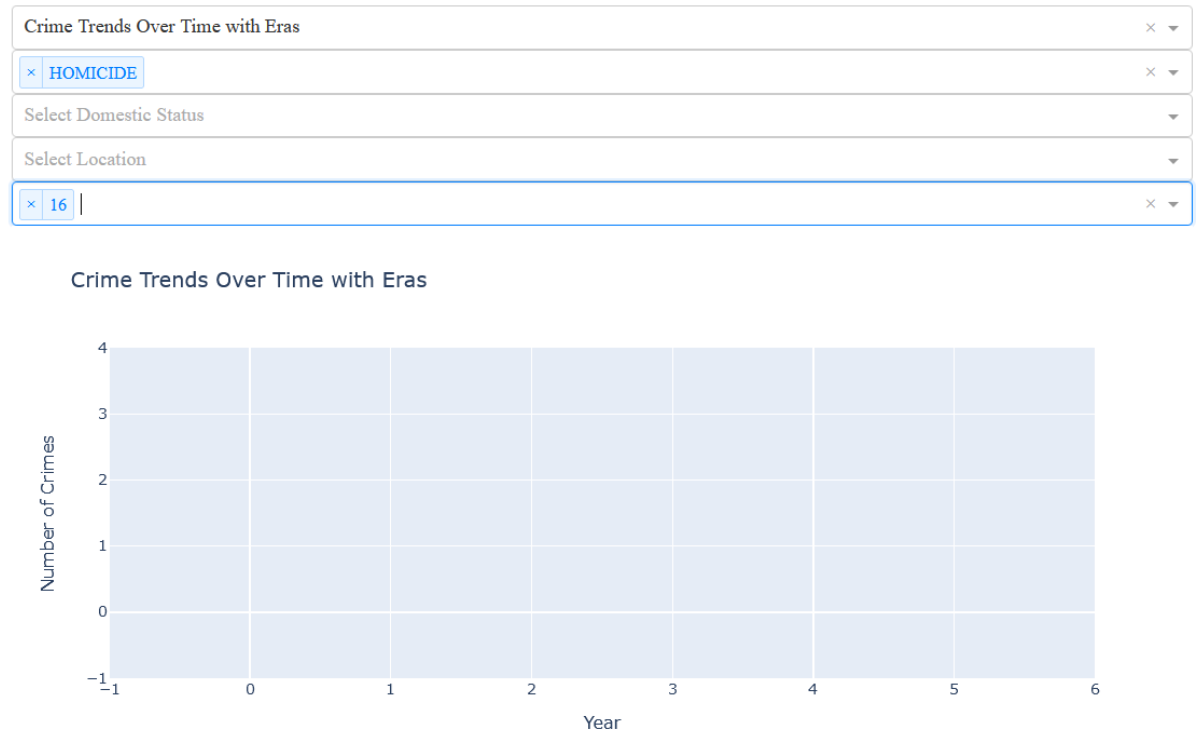
Crime type: Homicide

District: 17



· The homicides are less in numbers in this district and “0” during the Covid period.

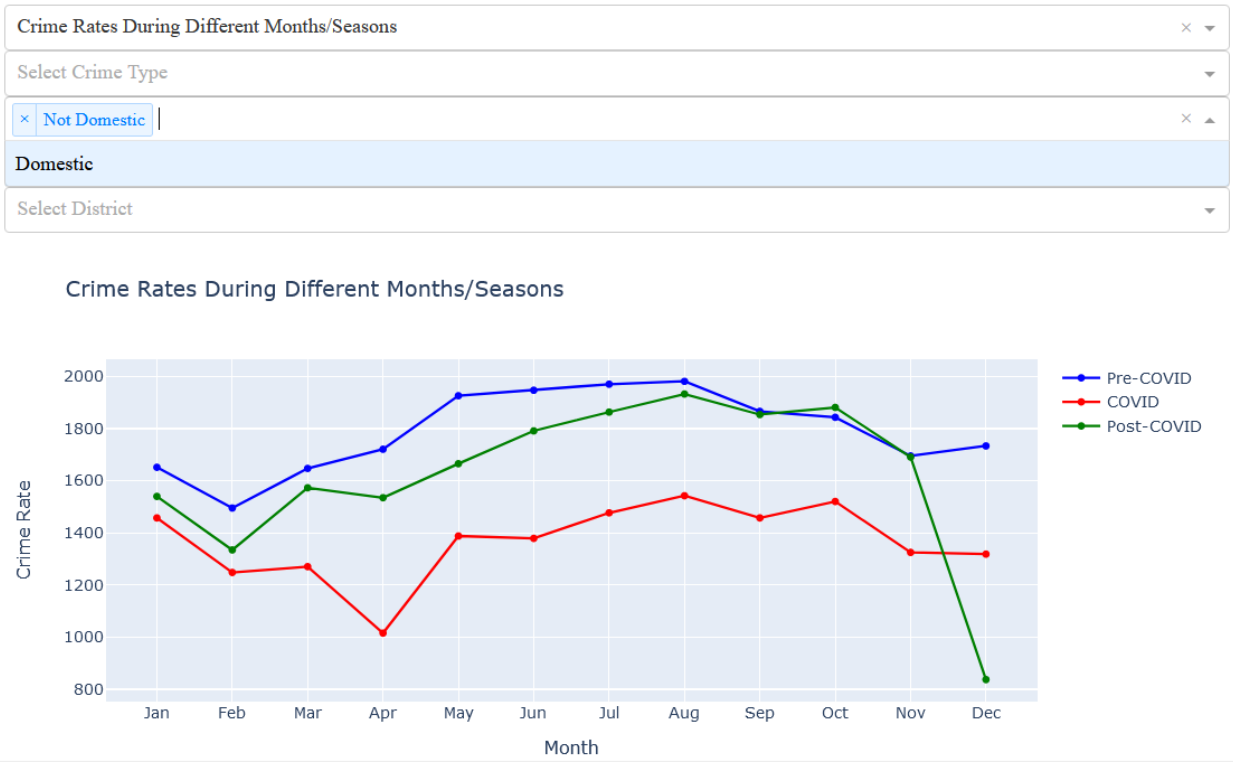
· While District 16 records “0” homicides during 2017-Present, which is a good indicator for a safe neighborhood!



Plot type 3: Crime Rates During Different Months/Seasons

Categories chosen

Non Domestic



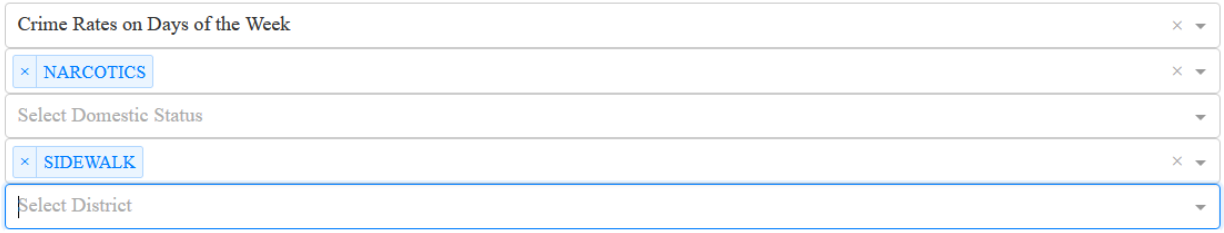
- The summer months have recorded the highest non-domestic crimes.

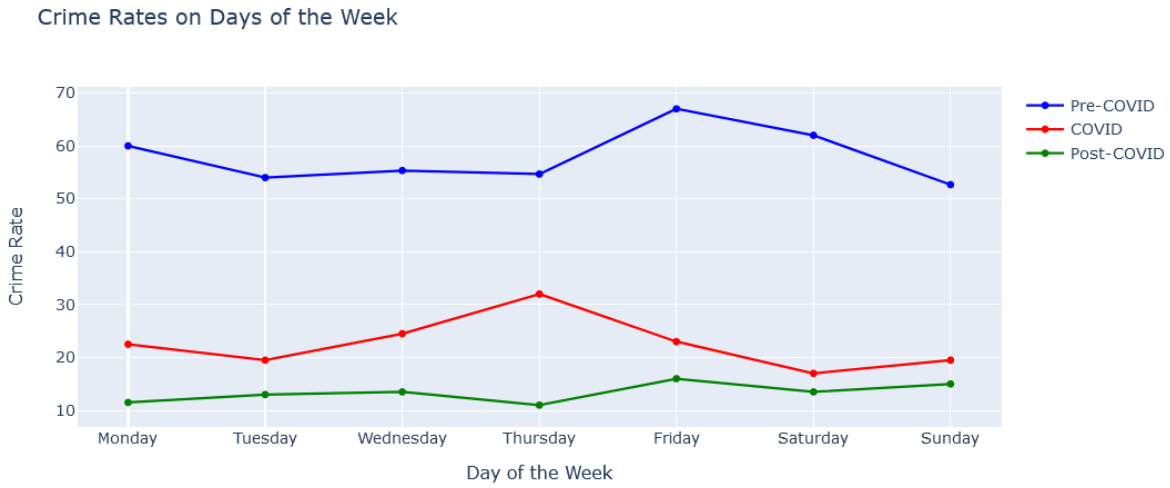
Plot type 4: Crime Rates During Days of the week

Categories chosen

Crime type: Narcotics

Location description: Sidewalk





- There doesn't seem to be much of a trend with the days of the week other than the fact that this type of crime was evidently higher before covid.

Summary : Interactive Visualization Plots

These seemingly simple line plots serve as a gateway to a comprehensive time series exploration of the Chicago Crime Dataset, offering users a nuanced perspective on crime trends and patterns with the flexibility to choose parameters that align with their analytical goals, gaining a detailed understanding of the dataset.

Story 2

Trends Over Location - Insights gained from the Static Visualization Plots

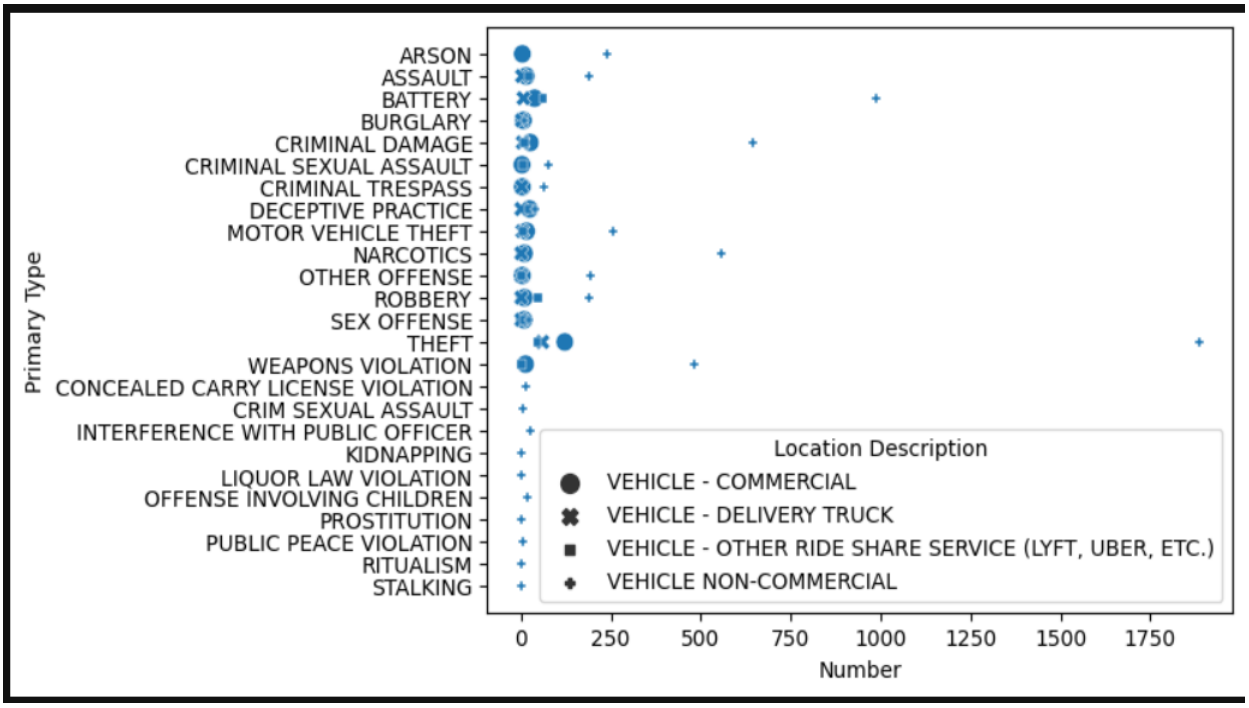
Plot type 5: Types of Crimes

Categories chosen

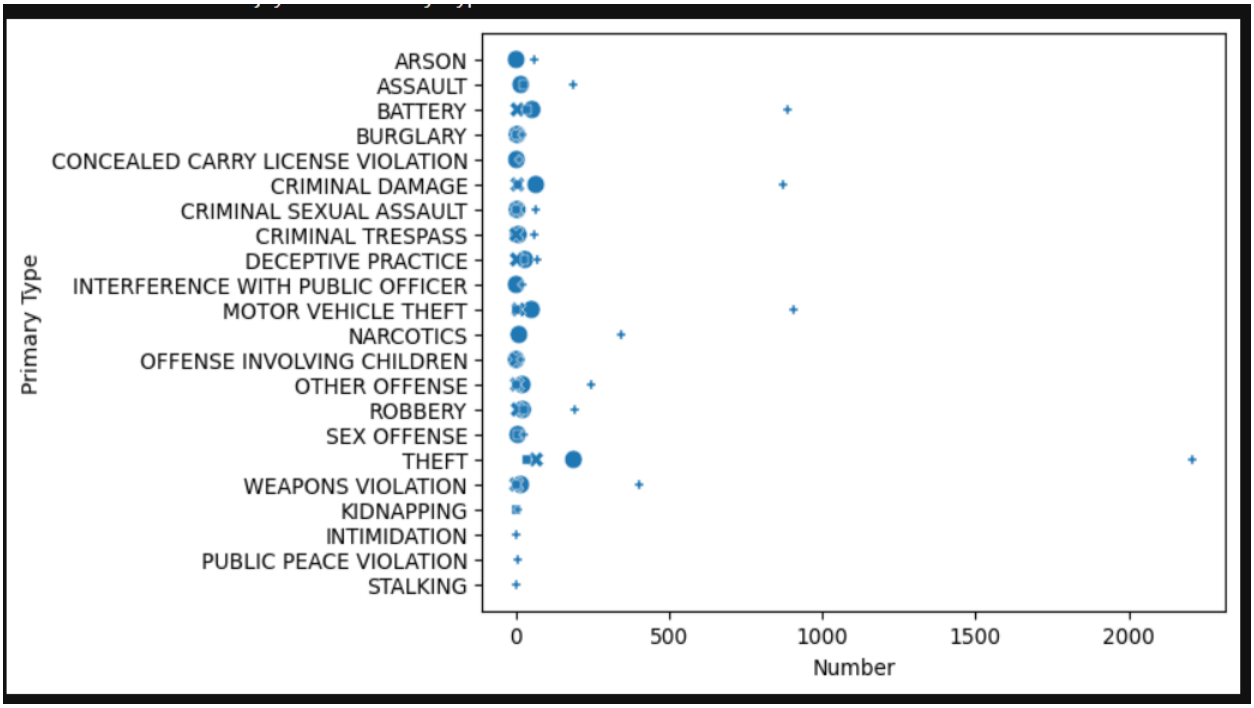
Location: VEHICLES

Here our major focus is on the type of crime i.e Vehicle which is highest in all the three eras, denoted by plus symbol. Inside the vehicle category it is observed that non-commercial vehicles are highest in all three eras. Reflecting high in pre-covid, the other eras were seen drastically reduced. This was one of the pivotal visualization in our exploration

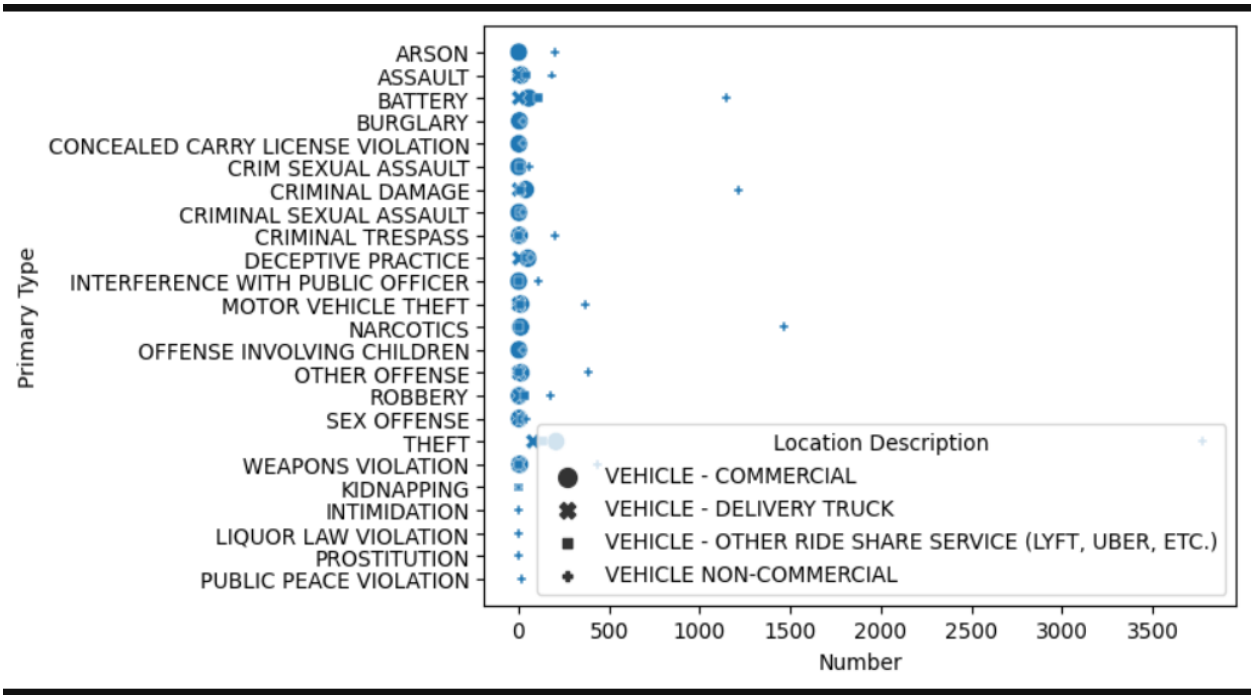
DURING COVID



POST COVID

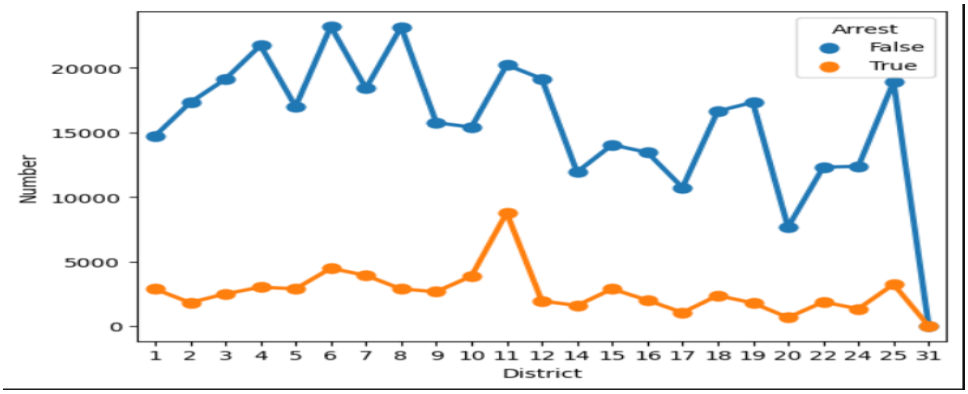

ARSON
ASSAULT
BATTERY
BURGLARY
CONCEALED CARRY LICENSE VIOLATION
CRIMINAL DAMAGE
CRIMINAL SEXUAL ASSAULT
CRIMINAL TRESPASS
DECEPTIVE PRACTICE
INTERFERENCE WITH PUBLIC OFFICER
MOTOR VEHICLE THEFT
NARCOTICS
OFFENSE INVOLVING CHILDREN
OTHER OFFENSE
ROBBERY
SEX OFFENSE
THEFT
WEAPONS VIOLATION
KIDNAPPING
INTIMIDATION
PUBLIC PEACE VIOLATION
STALKING
Primary Type
0
500
1000
1500
2000
Number

PRE-COVID

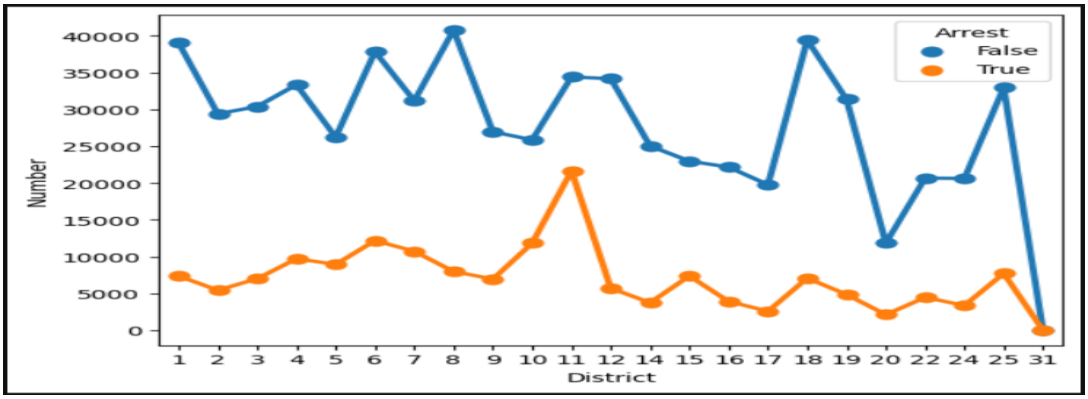

ARSON
ASSAULT
BATTERY
BURGLARY
CONCEALED CARRY LICENSE VIOLATION
CRIM SEXUAL ASSAULT
CRIMINAL DAMAGE
CRIMINAL SEXUAL ASSAULT
CRIMINAL TRESPASS
DECEPTIVE PRACTICE
INTERFERENCE WITH PUBLIC OFFICER
MOTOR VEHICLE THEFT
NARCOTICS
OFFENSE INVOLVING CHILDREN
OTHER OFFENSE
ROBBERY
SEX OFFENSE
THEFT
WEAPONS VIOLATION
KIDNAPPING
INTIMIDATION
LIQUOR LAW VIOLATION
PROSTITUTION
PUBLIC PEACE VIOLATION
Primary Type
Location Description
VEHICLE - COMMERCIAL
VEHICLE - DELIVERY TRUCK
VEHICLE - OTHER RIDE SHARE SERVICE (LYFT, UBER, ETC.)
VEHICLE NON-COMMERCIAL
0
500
1000
1500
2000
2500
3000
3500
Number

Plot type 6: Number of Arrests based on District regions

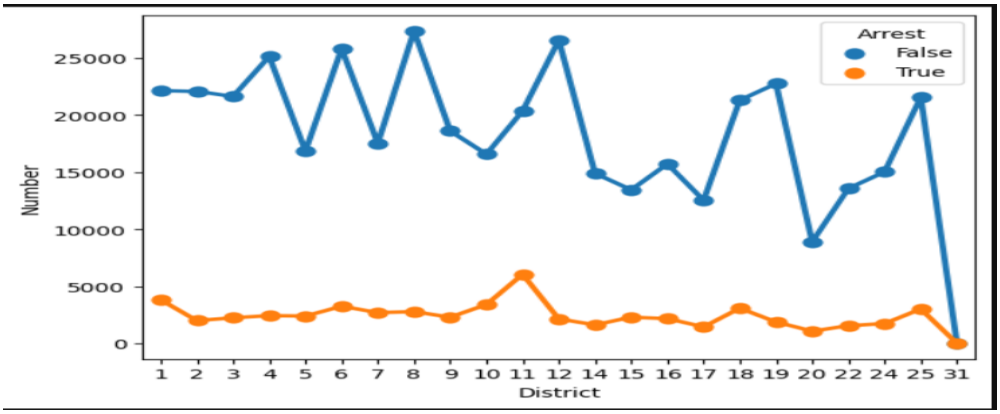
COVID



PRE-COVID



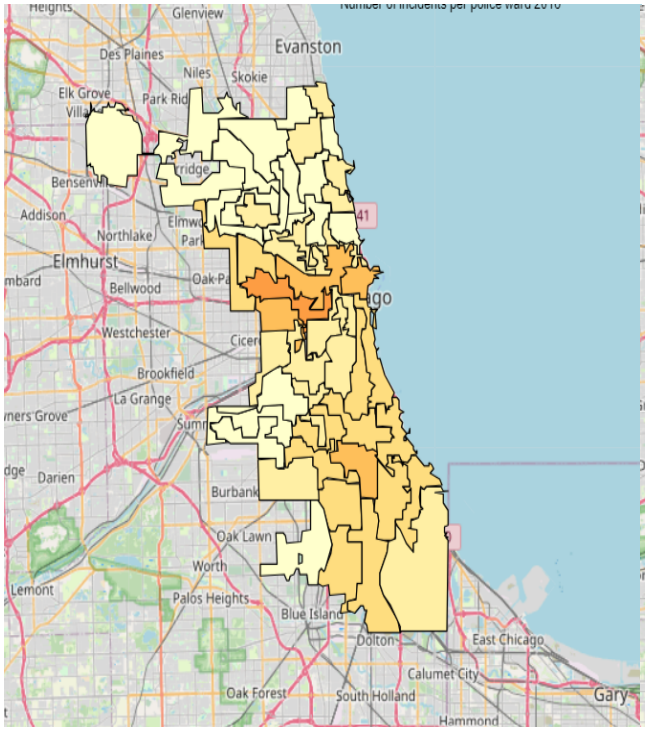
POST-COVID



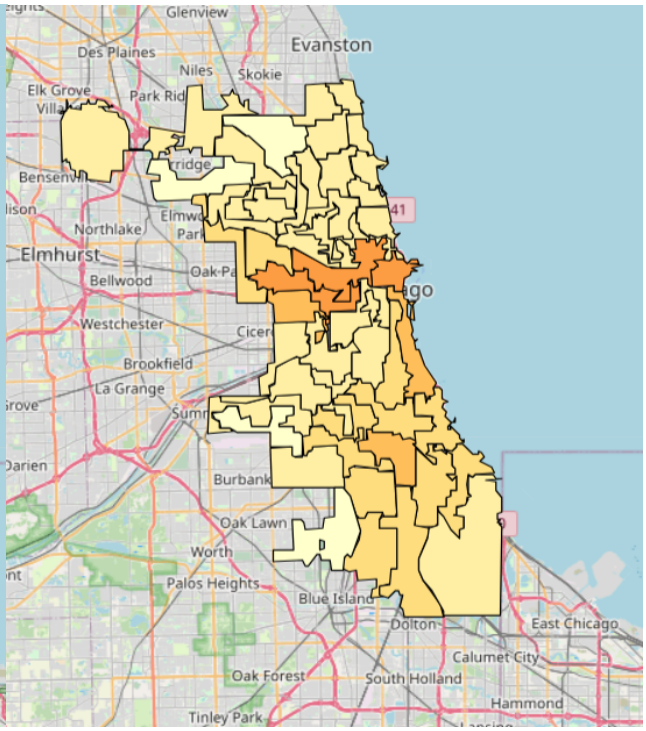
Insights from this line graph is that for overall theft of vehicles that happened most of them are not arrested and very few are caught and arrested. And when compared pre-covid has the highest non-arrest trend.

Plot type 6: Number of Arrests based on District regions

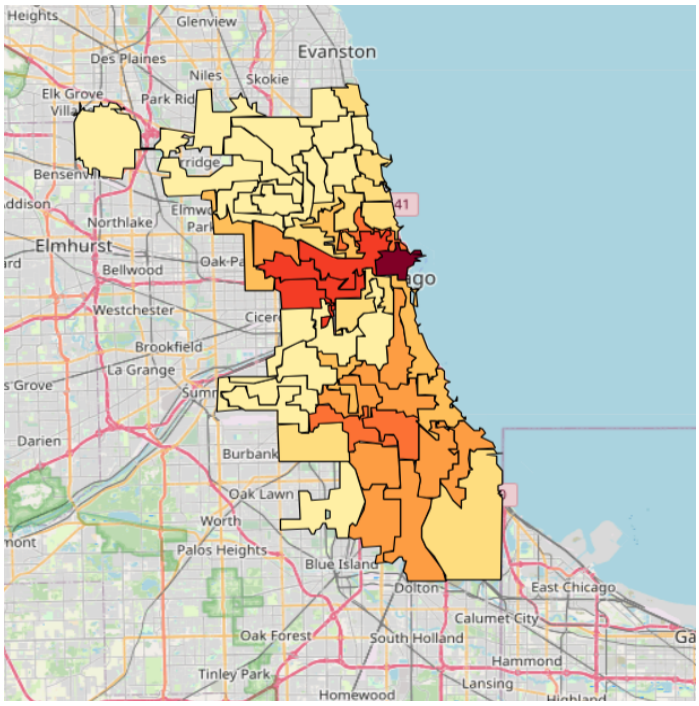
COVID



POST-COVID



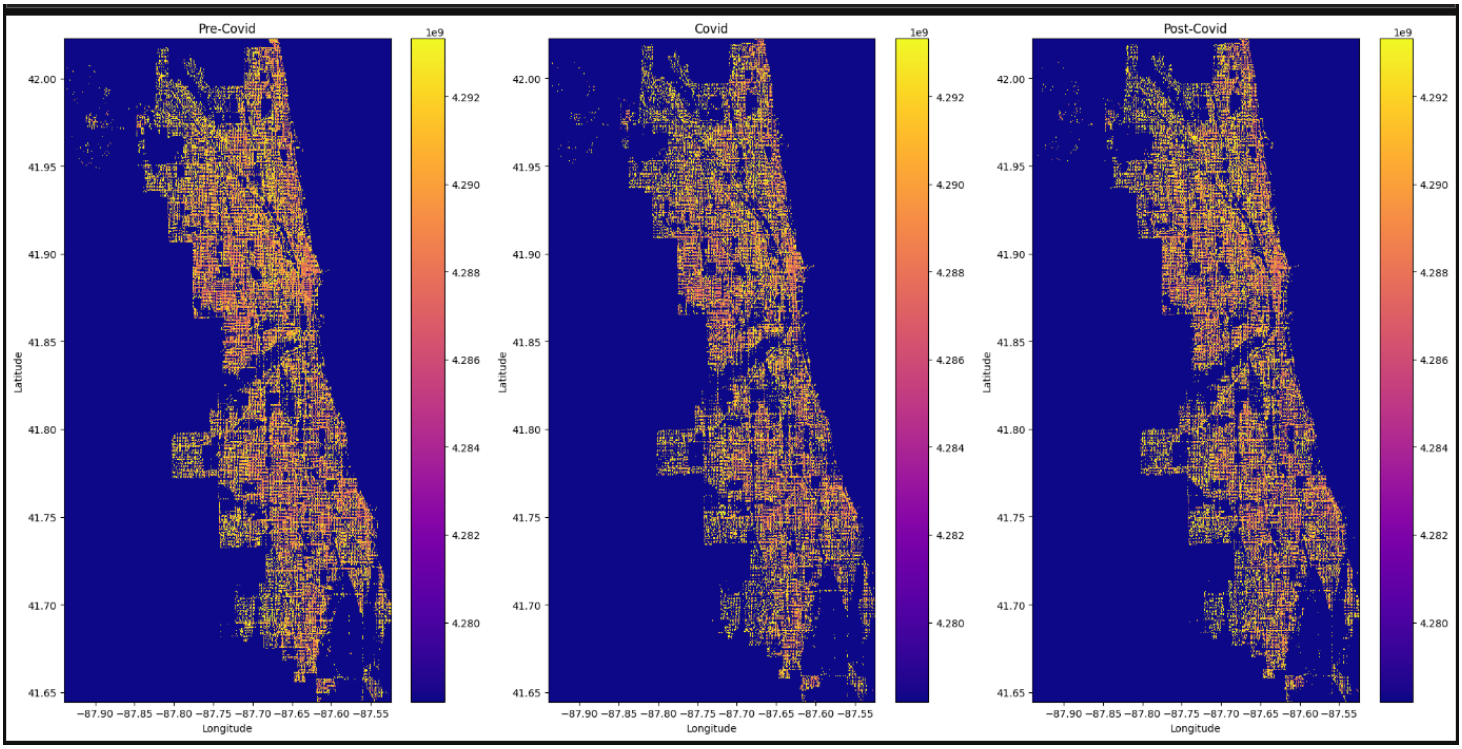
PRE-COVID



The above choropleth map shows the total number of arrests for each district, we can see that downtown has highest number of arrest but pre-covid arrest were high. And the second most arrests took place in southern Chicago with the trend of pre-covid.

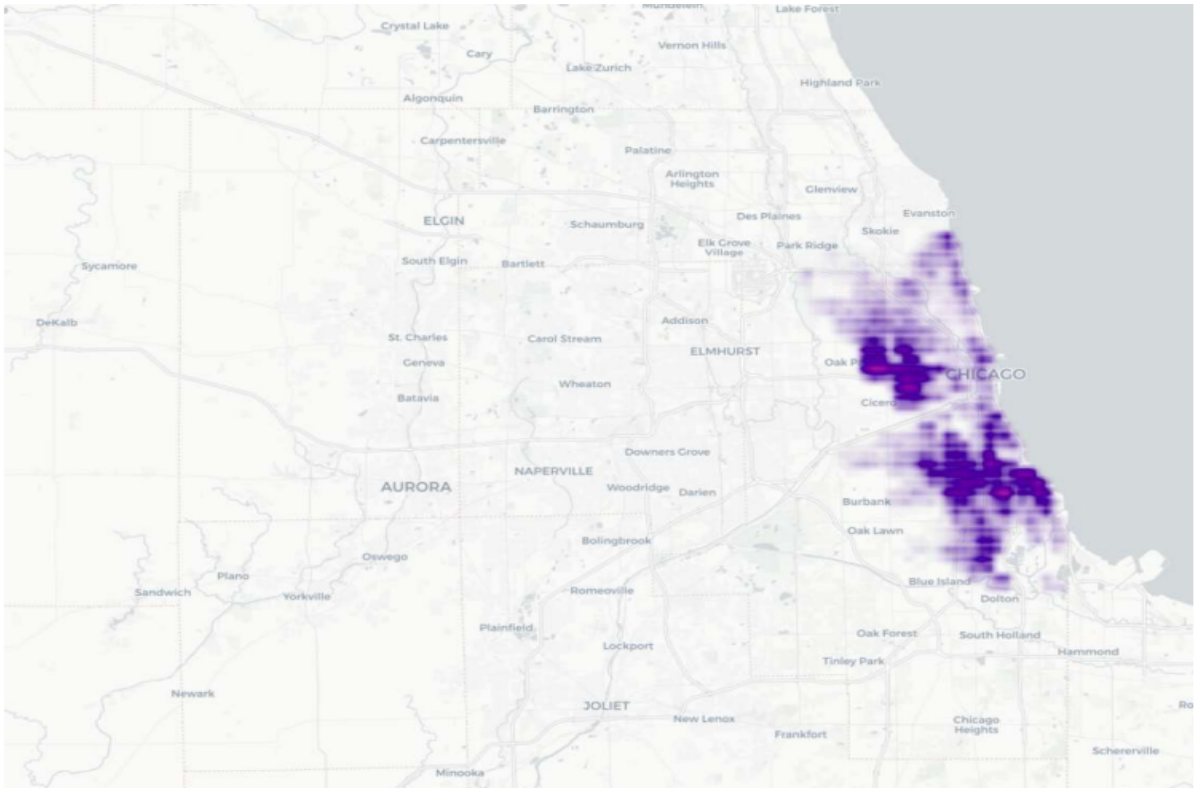
Plot type 7: Number of Arrests based on Ward regions

The following visualization is the number of crimes that had happened during Pre-, Post- and During COVID eras.

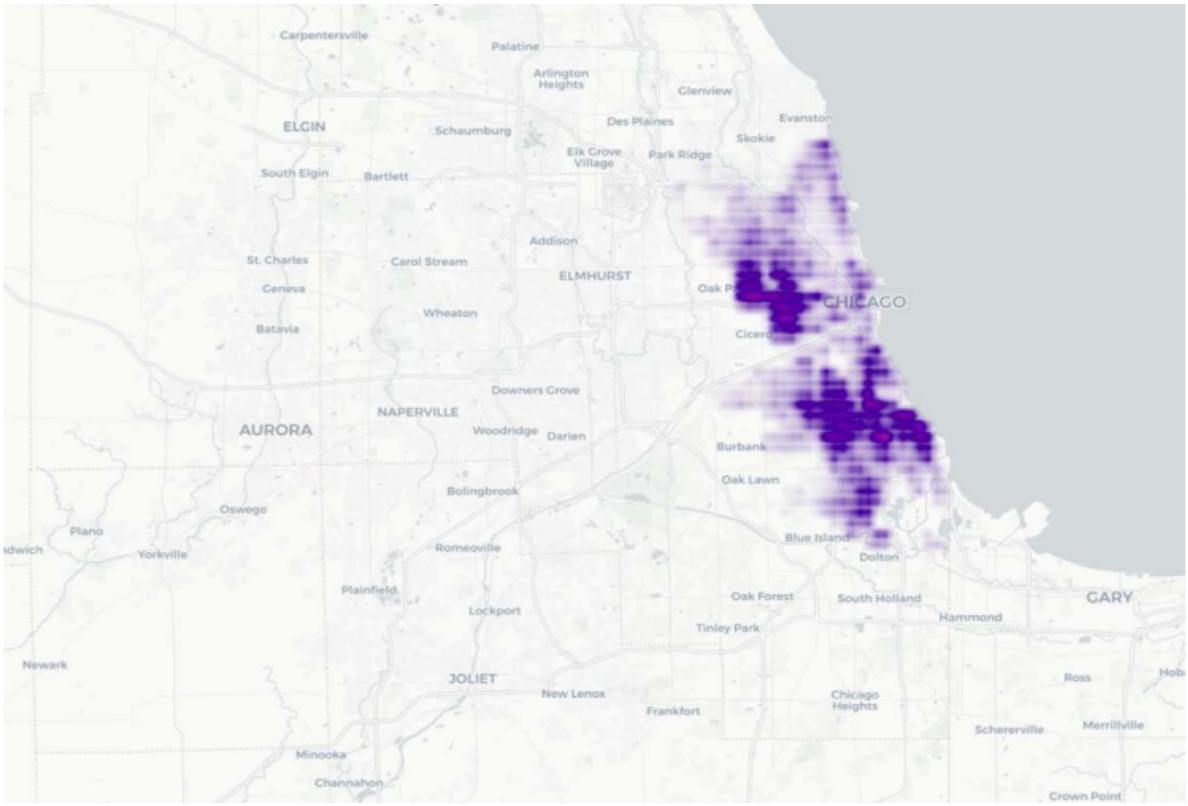


As we can see, the crimes have majorly happened during Pre COVID era and it has drastically reduced during COVID and not much have increased after COVID as well!

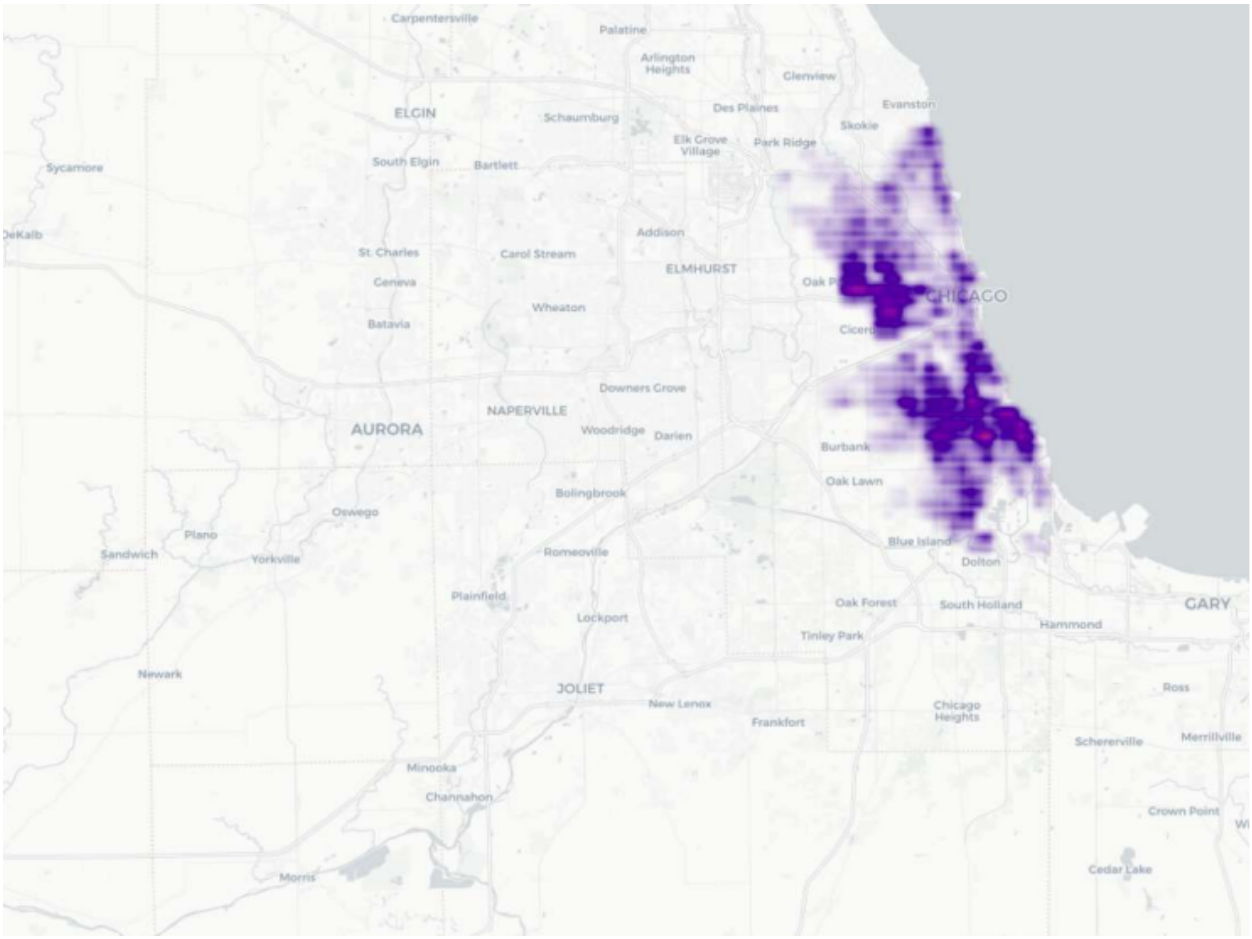
DURING COVID - No. of Domestic Violence



PRE-COVID



POST COVID

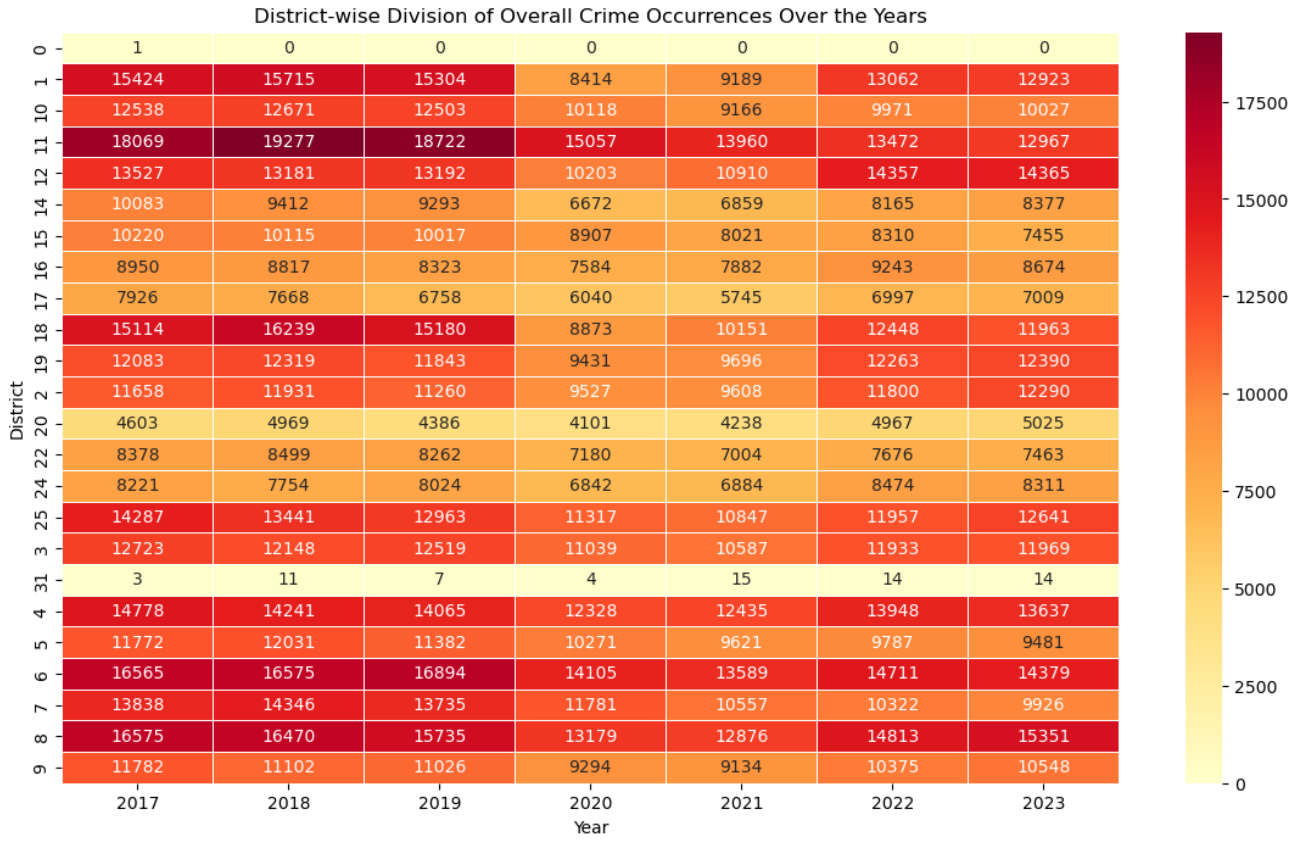


Conclusion:

The above heat map illustrates the crime category of domestic violence per district. More the intensity, the more the crime. Although the heatmap intenses more at the downtown area and southern area. Still the heatmap spread over the southern area is major, concluding that domestic violence is high all over the southern chicago districts. Surprisingly pre-covid era's domestic violence is high compared to during covid era, followed by post-covid which is also close to the during covid kind of intensity over the districts.

Plot type 8: District-wise analysis of overall crime occurrences with HeatMap

- The provided code creates a heatmap visualizing the district-wise division of overall crime occurrences over multiple years.
- The x-axis represents the years, the y-axis represents different districts, and each cell in the heatmap corresponds to the count of crimes in a specific district during a particular year.
- The color intensity of each cell indicates the relative magnitude of crime occurrences, with darker shades representing higher crime counts.
- This visualization allows for the easy identification of districts and years with notable variations in crime rates, offering a comprehensive overview of the spatial and temporal distribution of crimes across the city.



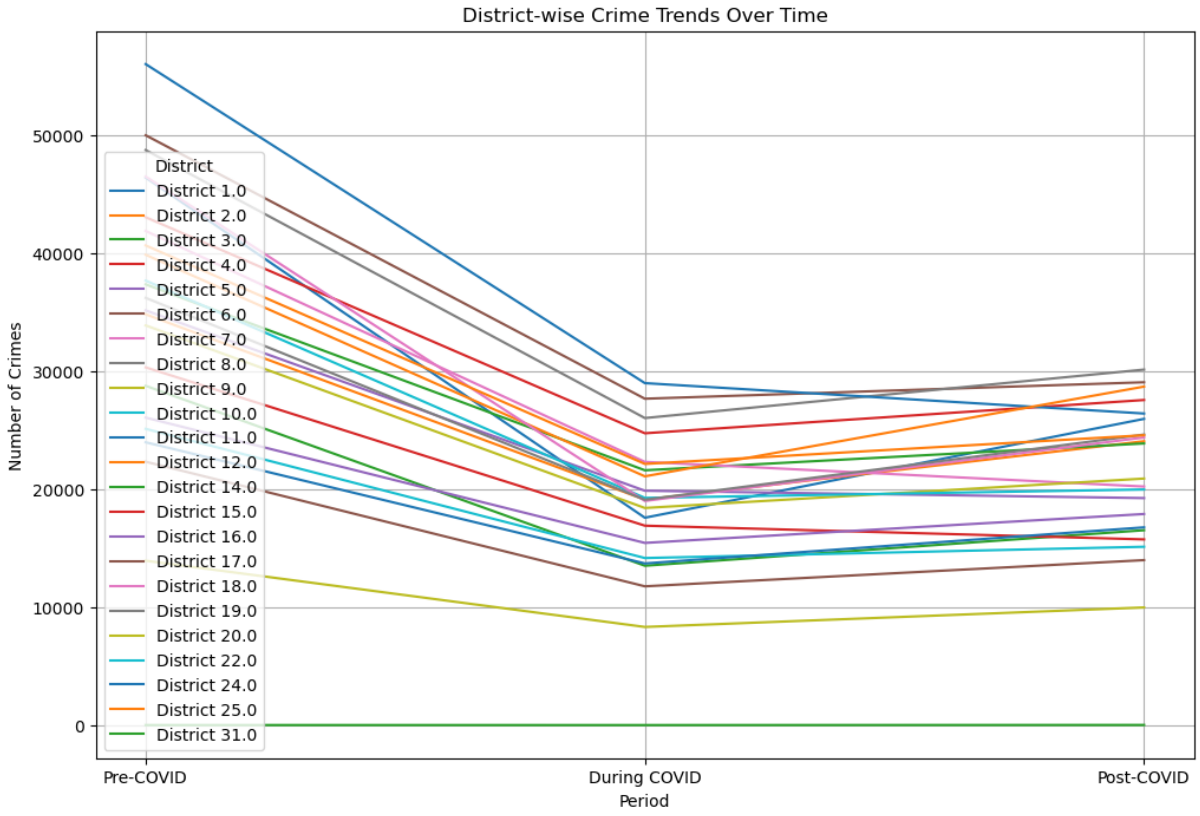
District	2017	2018	2019	2020	2021	2022	2023
0	1	0	0	0	0	0	0
1	15424	15715	15304	8414	9189	13062	12923
10	12538	12671	12503	10118	9166	9971	10027
11	18069	19277	18722	15057	13960	13472	12967
12	13527	13181	13192	10203	10910	14357	14365
14	10083	9412	9293	6672	6859	8165	8377
15	10220	10115	10017	8907	8021	8310	7455
16	8950	8817	8323	7584	7882	9243	8674
17	7926	7668	6758	6040	5745	6997	7009
18	15114	16239	15180	8873	10151	12448	11963
19	12083	12319	11843	9431	9696	12263	12390
2	11658	11931	11260	9527	9608	11800	12290
20	4603	4969	4386	4101	4238	4967	5025
22	8378	8499	8262	7180	7004	7676	7463
24	8221	7754	8024	6842	6884	8474	8311
25	14287	13441	12963	11317	10847	11957	12641
3	12723	12148	12519	11039	10587	11933	11969
31	3	11	7	4	15	14	14
4	14778	14241	14065	12328	12435	13948	13637
5	11772	12031	11382	10271	9621	9787	9481
6	16565	16575	16894	14105	13589	14711	14379
7	13838	14346	13735	11781	10557	10322	9926
8	16575	16470	15735	13179	12876	14813	15351
9	11782	11102	11026	9294	9134	10375	10548

- This HeatMap gives an overall idea of which districts are crime intensive and which are relatively safe.

Plot type 9: District-wise analysis of overall crime occurrences with Line Plot

- This generates a line plot depicting district-wise crime trends over three distinct periods: Pre-COVID (2017-2019), During COVID (2020-2021), and Post-COVID (2022-present).
- The x-axis represents the temporal periods, while the y-axis indicates the number of reported crimes.

- Each district is represented by a line that spans the three periods, providing a visual comparison of how crime counts have changed over time.
- The legend indicates the respective districts, offering insight into variations in crime patterns across different regions of interest.
- The plot enables a clear understanding of the impact of these temporal periods on crime rates in various districts.

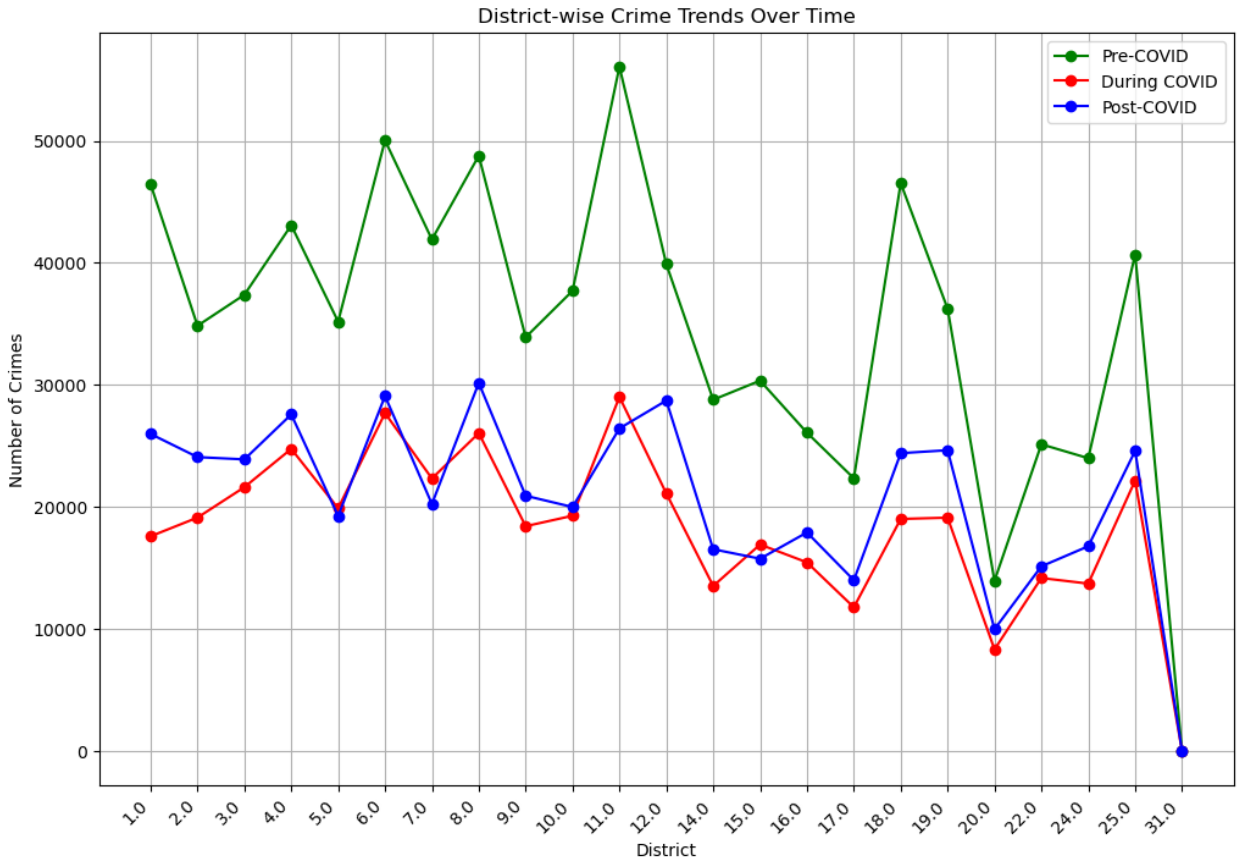


Plot type 10: District-wise analysis of overall crime occurrences with Line Plot

- The provided plot illustrates the district-wise trends of reported crimes over three distinct periods:

- Pre-COVID (2017 Jan - 2019 Dec) in green
- During COVID (2020 Jan - 2021 Dec) in red
- Post-COVID (2022 Jan - Present) in blue

- Each line represents the respective count of crimes reported in Chicago districts during the specified time frames.
- The x-axis displays the individual districts, while the y-axis represents the number of reported crimes.
- The visual comparison enables an observation of how crime patterns in each district have evolved through the pre-pandemic, pandemic, and post-pandemic eras.



Results:

Novelty and Insights

1. Impact of COVID-19 on Crime Trends:

By analyzing crime trends over the pre, during, and post-COVID periods, the team uncovered interesting patterns, such as a significant drop in overall crimes during the COVID-19 pandemic. This insight is crucial for understanding the relationship between external events and criminal activities.

2. Holistic Time Series Analysis:

The team introduced a comprehensive time series analysis, spanning pre, during, and post-COVID eras, offering a nuanced perspective on crime trends. This approach allows for a more contextual understanding of the impact of external factors such as the pandemic on crime rates.

3. Multi-Faceted Location-Based Insights:

The team explored crime trends based on different locations, districts, and wards, shedding light on spatial variations. The static visualizations, such as choropleth maps and line plots, provide clear insights into district-wise and ward-wise crime occurrences, contributing to a more granular understanding of crime distribution.

4. Unique Crime Heatmap:

The Crime Heatmap is a standout feature, offering a visually impactful representation of crime density across Chicago. This novel visualization provides an immediate and intuitive understanding of high and low crime zones, contributing to a more accessible presentation of the data.

5. Interactive Visualization for Deeper Insights:

The team employed interactive visualization plots, enhancing user engagement and providing a dynamic exploration of crime data. The ability to dynamically change parameters and utilize hover tips adds a layer of interactivity that facilitates a more in-depth analysis.

Craftsmanship and Details

Data Management:

- **Craftsmanship:** The implementation of data management, particularly the utilization of MongoDB for its document-based storage, reflects a strategic choice aligned with the project's goals.

- **Details**: Details in data handling, including data validation, normalization, and secure storage, exhibit a meticulous approach to safeguarding data integrity.

Visualization and Analytics:

- **Craftsmanship**: The inclusion of insightful and interactive maps showcases craftsmanship in presenting complex data in an understandable format.

- **Details**: Suggestions for future enhancements, such as introducing a more robust and dynamic map visualization through filtering and sorting provides the complete package.

Discussion and Conclusion

We have selected all of our visualizations and methods for this project according to the feedback we got in our project proposal slides and have followed that by showing static and dynamic visualizations. And we also focused on bringing trends and patterns from the Covid era, which was also encouraged to us in our feedback.

In conclusion, our comprehensive analysis of Chicago's crime landscape through advanced data visualization techniques has provided valuable insights into the multifaceted nature of criminal activities in the city. Through the judicious use of various visualization tools, we have uncovered compelling patterns and trends that contribute to a nuanced understanding of the factors influencing crime in different contexts.

Insights:

A meticulous examination of the Chicago Crime Analysis and Visualization project has unveiled significant insights into its conception, execution, and potential ramifications.

User-Centric Insights:

Spatial Awareness for Enhanced User Experience:

The project's prioritization of spatial awareness in crime analysis aligns with contemporary user expectations, providing an enriched understanding of crime distribution across the city.

Incorporating geographic elements in visualizations enhances the overall user experience, allowing users to grasp crime trends in specific neighborhoods.

Strategic Focus on Crime Categories:

The emphasis on categorizing crime types allows users to delve into specific criminal activities, catering to their preferences and enabling a more nuanced exploration of the data.

Recognizing the importance of providing detailed crime information demonstrates a user-centric approach, empowering users to focus on areas of personal or community concern.

Recommendations for Further Customization

Recognizing the potential for community engagement, the project could further customize its features by incorporating community-specific data or allowing users to report and track localized incidents. Facilitating user contributions and community collaboration adds a layer of customization that aligns with user expectations for a more participatory experience.

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2. *Getting started - Folium 0.1.dev1+g0f4d57f documentation*. https://python-visualization.github.io/folium/latest/getting_started.html

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4. My-Machine-Learning-Projects-CT.(n.d.). *GitHub- My-Machine-Learning-Projects-CT/chicago-crime-data-analysis: [Data Science] Chicago Crime data analysis from 2001 to present.* GitHub. https://github.com/My-Machine-Learning-Projects-CT/chicago-crime-data-analysi s/tree/master

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