Analysis of Crime in Chicago (2013-2023)

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July 15, 2024

1 Introduction

Crime analysis is a critical component of urban safety and public policy planning. This report focuses on crime data from Chicago over an eleven-year period, from 2013 to 2023. The primary objectives of this analysis are as follows:

- To assess the yearly number of crimes reported in Chicago.

- To calculate and analyze the average accumulated crime cases per year.

- To categorize and analyze the types of crimes committed.

- To investigate the geographical distribution of crimes within the city.

Understanding the temporal and spatial distribution of crimes can provide valuable insights into underlying patterns and trends. Such information is crucial for law enforcement agencies, policy makers, and community organizations to devise effective crime prevention strategies and allocate resources efficiently.

2 Yearly Number of Crimes (2013-2023)

- Since 2014, the number of crime cases has significantly reduced, with only around 270,000 reported crimes in 2014 and even lower for the following years, which is a sharp reduction from over 300,000 reported incidents in 2013.

- An evident reduction in the number of crime cases in 2020 and 2021 due to the COVID-19 pandemic lockdown.

- A subsequent rise in crime reports in 2022 and 2023, suggesting a recent upward trend in criminal activities since the pandemic situation eased and lockdowns gradually stopped.
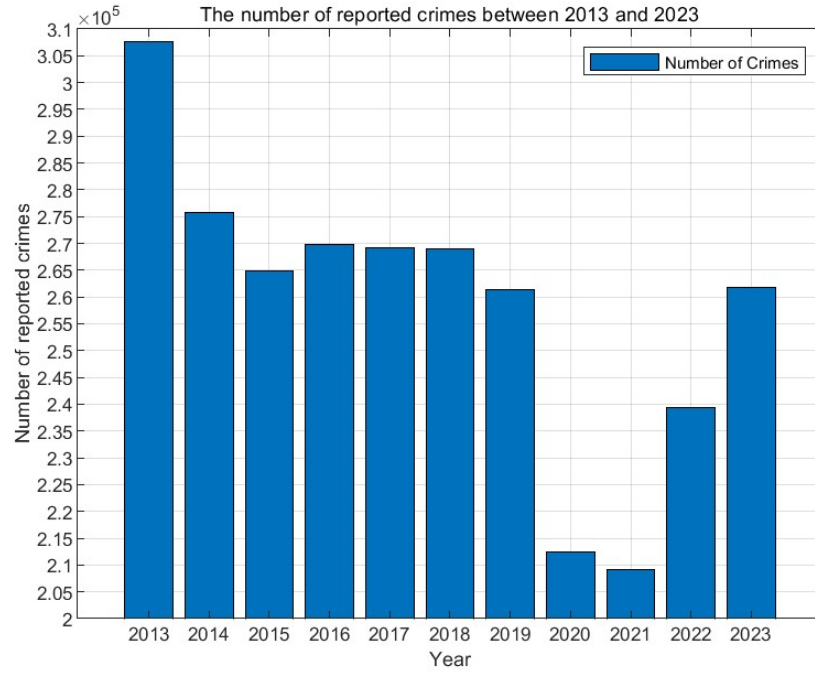
Figure 1: The number of reported crimes between 2013 and 2023

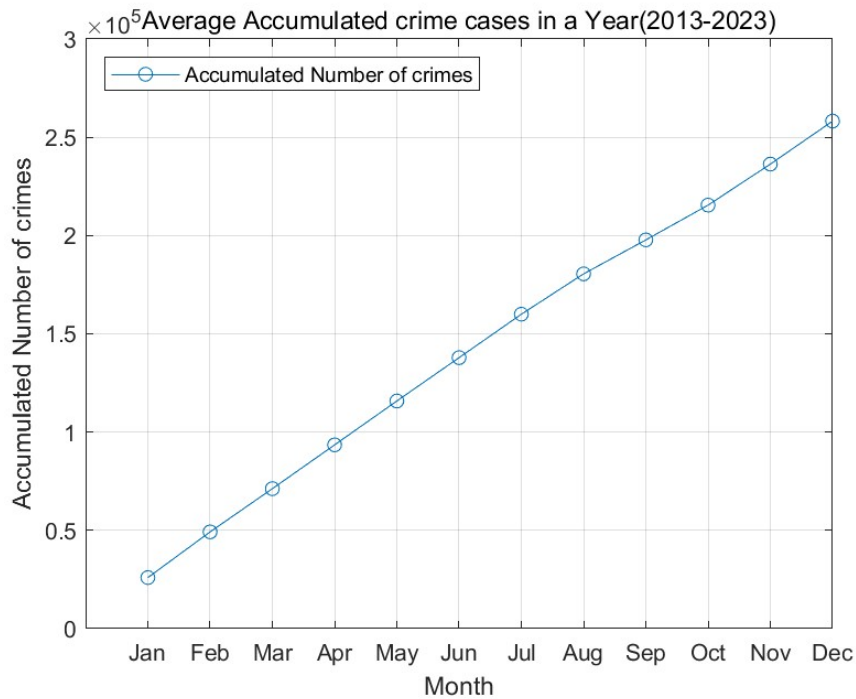# 3 Average Accumulated Crime Cases in a Year

Figure 2: Average accumulated number of crimes in a year (2013-2023)

Figure 2 illustrates the average accumulated number of crimes per month over the eleven-year period. The linear trend observed suggests a consistent accumulation of crime cases throughout the year, with no significant deviations in monthly crime accumulation patterns, only a slight dip around August. This steady increase highlights the ongoing challenge of crime prevention and the need for continuous efforts

to address criminal activities.

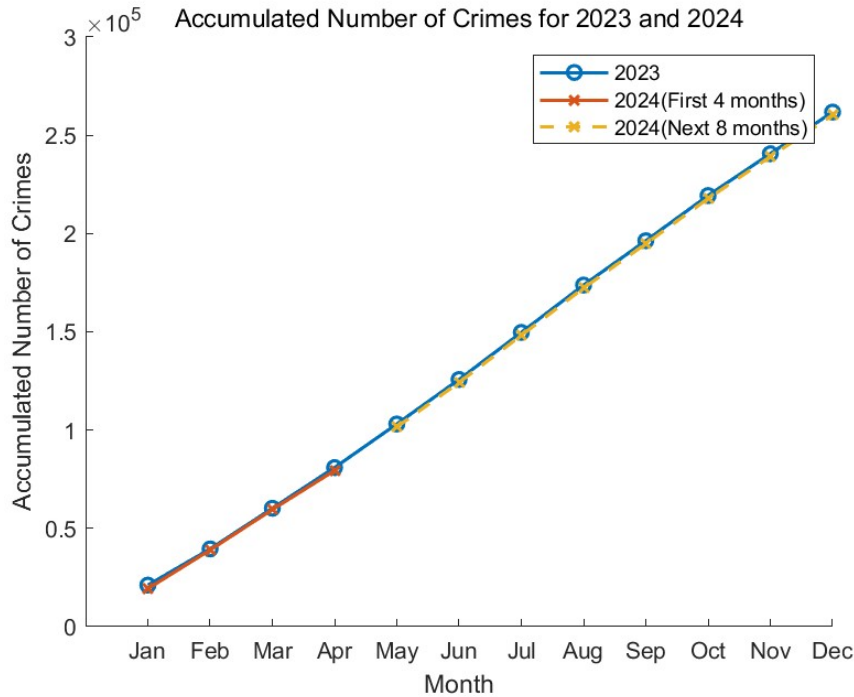# 4 Predicted Accumulated Crime Numbers for 2023 and 2024

Figure 3: Accumulated number of crimes for 2023 and 2024 (predicted)

Figure 3 compares the accumulated number of crimes for 2023 and the first four months of 2024, with projections for the remainder of 2024. The projection suggests similar crime trends continuing into 2024, with a slight increase compared to 2023. This predictive analysis can assist in proactive crime prevention measures and resource allocation.

5 Analysis of Crime Types

The pie chart in Figure 4 presents the distribution of primary crime types reported between 2013 and 2023. Theft is the most prevalent crime, comprising significant portions of the total, followed by battery and assault. Other prevalent crime types include Assault, Criminal Damage, and Narcotics-related offenses. Lesser, but still notable, are crimes like Burglary, Motor Vehicle Theft, and Deceptive Practices. Understanding the distribution of crime types is essential for developing targeted intervention strategies and allocating resources effectively to combat specific types of crimes.
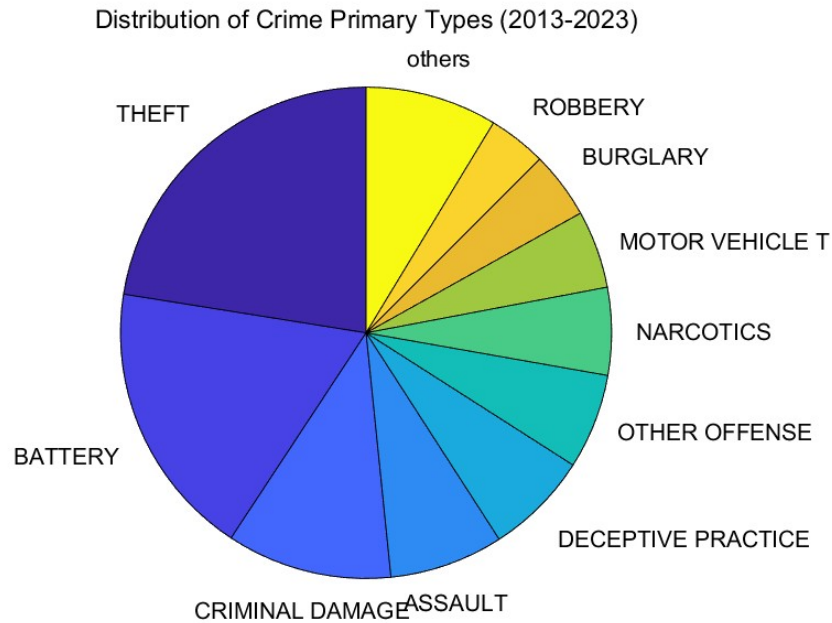
Figure 4: Distribution of crime primary types (2013-2023)
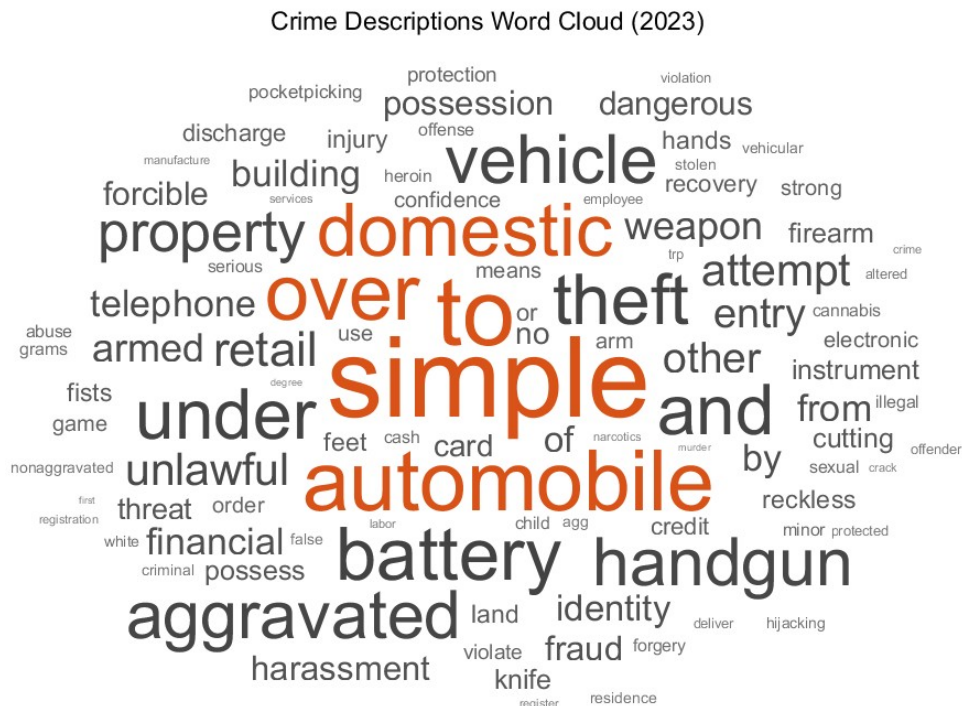
6 Crime Descriptions Analysis

Figure 5: Crime descriptions word cloud (2023)

The word cloud in Figure 5 provides a visual representation of the most common terms found in crime descriptions for the year 2023. Terms like "domestic," "simple," "battery," and "automobile" appear prominently, indicating their frequent occurrence in crime reports.

The term "domestic" often refers to domestic violence or disputes, which remains a significant issue.

Studies indicate that domestic violence incidents can spike due to economic stress or isolation, factors that have been particularly relevant during the pandemic.

"Simple" usually refers to simple assault, a less severe form of assault that doesn't involve a weapon or result in serious injury. Simple assaults are among the most commonly reported violent crimes in urban areas.

The prevalence of the term "battery" suggests a high incidence of physical altercations. Research shows that battery cases often correlate with alcohol consumption and high-stress environments.

The term "automobile" points to the frequent occurrence of vehicle-related crimes, such as theft or vandalism. Automobile-related crimes are common in metropolitan areas due to the high density of vehicles.

This qualitative analysis offers insights into the nature of crimes and can guide the development of specific crime prevention programs.
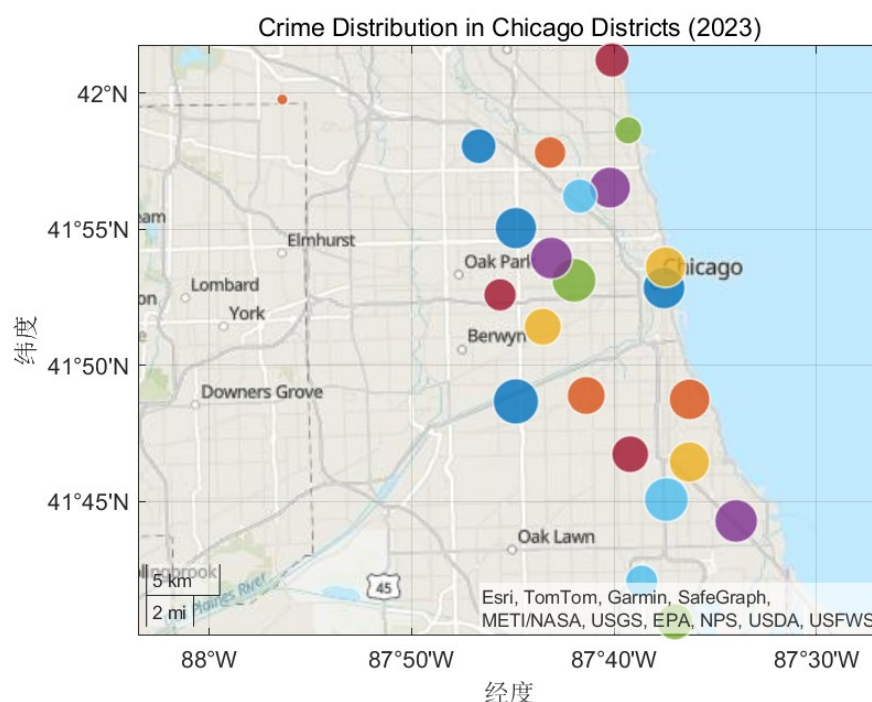
7 Crime Location Analysis

Figure 6: Crime distribution in Chicago districts (2023)

Figure 6 shows the spatial distribution of crimes across various districts in Chicago for the year 2023. The bubble chart highlights certain districts as hotspots for criminal activities, indicating a higher concentration of reported crimes. This geographical analysis helps identify areas that require increased policing efforts and community support to mitigate crime rates.

8 Crime Location Density and Community Area Boundaries (2023)

Figure 7 illustrates the density of crime locations overlaid with community area boundaries in Chicago for the year 2023. The map shows high-density areas, particularly in central and southern regions of Chicago. These areas are highlighted in darker shades, indicating a higher concentration of reported crimes.

The analysis of this density plot reveals several key observations:

- The central areas, including downtown Chicago, show a high density of crimes, which is expected due to the high population density and economic activities in these areas.
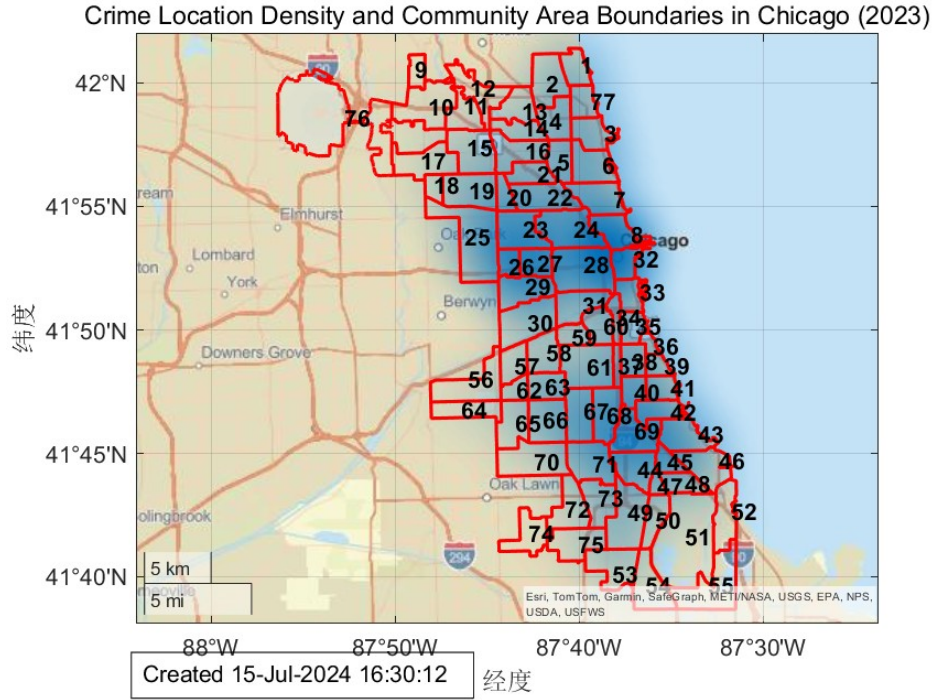
Figure 7: Crime location density and community area boundaries in Chicago (2023)

- Southern districts, such as those numbered 67, 68, and 69, also exhibit high crime densities. These areas often face socioeconomic challenges, which can contribute to higher crime rates.

- Northern and western districts show relatively lower crime densities, suggesting these areas might have more effective crime prevention measures or different socioeconomic conditions.

This spatial analysis of crime locations and community area boundaries helps identify critical areas requiring focused law enforcement and community intervention efforts. By targeting these high-density crime areas, law enforcement agencies can implement more effective crime reduction strategies and allocate resources more efficiently.

9   Analysis of Arrest Rate (2023-2023)

The line graph in Figure 8 illustrates the arrest rate trend in Chicago over the eleven-year period from 2013 to 2023. The arrest rate is defined as the ratio of arrests to the total number of reported crimes in a given year. Several key observations can be made from the graph:

- **High Arrest Rates in Early Years (2013-2014)**: The arrest rate was relatively high at the beginning of the period, peaking around 0.28 to 0.29. This indicates that during these years, a higher proportion of reported crimes resulted in arrests. This could be attributed to effective policing strategies, higher resource allocation, or better community cooperation with law enforcement.

- **Decline from 2014 to 2016**: There is a noticeable decline in the arrest rate starting from 2014, dropping sharply to approximately 0.21 by 2016. This decline may be due to various factors such as changes in police practices, resource limitations, or increased crime complexity making arrests more challenging.

- **Stabilization and Slight Increase (2016-2019)**: Between 2016 and 2019, the arrest rate stabilized around 0.20 with a slight increase peaking at around 0.22 in 2019. This period of stability could indicate a plateau in the efficiency of arrests relative to crime rates. The slight increase might reflect improvements in law enforcement tactics or resource allocation during these years.
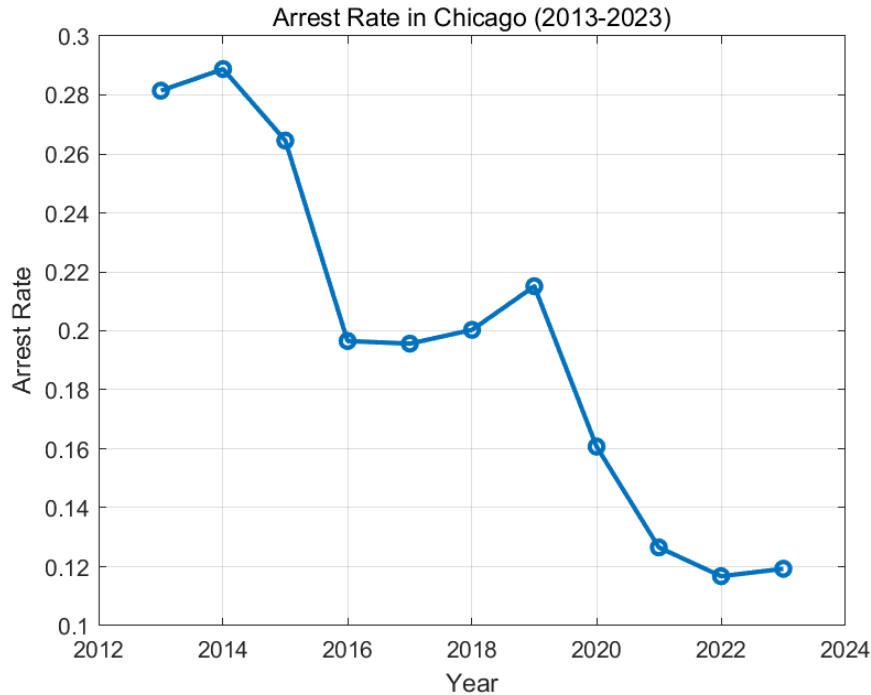
Figure 8: Arrest Rate in Chicago (2013-2023)

- **Significant Drop in 2020 and 2021**: A significant drop in the arrest rate is observed in 2020 and 2021, reaching as low as approximately 0.13. This sharp decline coincides with the COVID-19 pandemic, which likely impacted police operations, enforcement capabilities, and overall crime dynamics. Lockdowns and restrictions may have also altered the nature of crimes being committed, with some types potentially being harder to address through arrests.

- **Low and Stabilized Rates in Recent Years (2022-2023)**: In 2022 and 2023, the arrest rate remained low and stabilized around 0.12 to 0.13. The continued low arrest rates could be due to ongoing adjustments in post-pandemic policing strategies, resource challenges, or shifts in crime patterns.

Overall, the trend reveals a general decrease in the arrest rate over the past decade, with significant impacts likely due to external events such as the pandemic. This declining trend raises questions about the evolving challenges faced by law enforcement in Chicago and highlights the need for adaptive strategies to address these challenges effectively.

Further research and detailed data analysis would be required to identify the precise causes of these trends and to develop targeted interventions aimed at improving the arrest rate while ensuring community safety and justice.

10 Conclusion

This report provides a comprehensive analysis of crime trends in Chicago from 2013 to 2023, focusing on yearly crime numbers, average accumulated crime cases, types of crimes, geographical distribution, and arrest rates. The key findings and observations highlight significant patterns and changes in crime dynamics over the eleven-year period.

The analysis reveals a notable decline in the overall number of reported crimes, particularly after 2014, with the most significant reductions observed in 2020 and 2021 during the COVID-19 pandemic. However, a resurgence in crime rates is noted in 2022 and 2023 as the pandemic restrictions eased. The study of crime types indicates that theft, battery, and assault remain the most prevalent crimes, necessitating targeted intervention strategies.

Geographical analysis identifies central and southern regions of Chicago as high-density crime areas, suggesting the need for focused law enforcement and community support in these areas. The arrest

rate analysis shows a general decline over the past decade, with significant drops during the pandemic years, reflecting the challenges faced by law enforcement in maintaining public safety under extraordinary circumstances.

This report underscores the importance of adaptive strategies in crime prevention and resource allocation to address the evolving challenges in urban safety. Continuous monitoring and analysis of crime data are crucial for developing effective interventions and ensuring community safety. Future research should delve deeper into the underlying causes of these trends and explore innovative approaches to enhance law enforcement effectiveness and community engagement.

By understanding the complex dynamics of crime in Chicago, stakeholders can better collaborate to implement policies and initiatives that foster a safer and more secure environment for all residents.