Crime Data Analysis

Analyzing Crime Trends, Victim Demographics, and Geospatial Patterns

BY

RAMGOPAL DEVARUPPALA

Objectives

1. Analyze crime trends over time.
2. Explore victim demographics such as age, sex, and ethnicity.
3. Identify weapon types used in crimes.
4. Perform geospatial analysis to find crime hotspots.
5. Provide actionable insights for law enforcement and policy-making.

Problem Statement

Understanding crime patterns is crucial for public safety.

Identifying key crime trends and their relation to victim demographics.

Analyzing the geographic distribution of crimes to allocate resources efficiently.

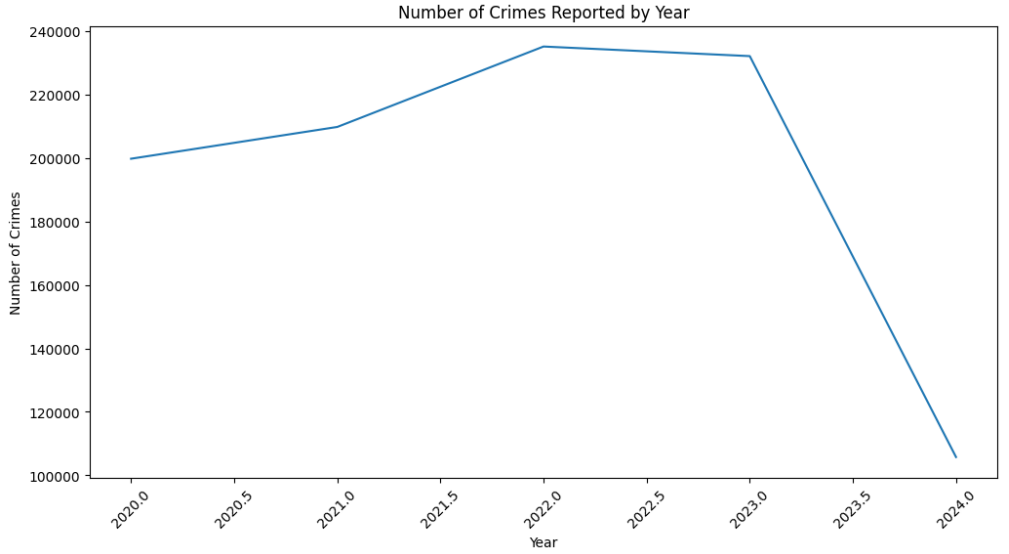
Addressing gaps in crime data to improve analysis and decision-making.

Methodology

- **Data Preprocessing**: Handle missing values and format conversion.
- **Exploratory Data Analysis (EDA)**: Analyzed crime trends, weapon usage, and victim demographics.
- **Geospatial Analysis**: Mapped crime locations and identified hotspots.
- **Statistical Analysis**: Correlation matrix to examine relationships between features.
- **Visualizations**: Created various charts and heatmaps to represent findings.

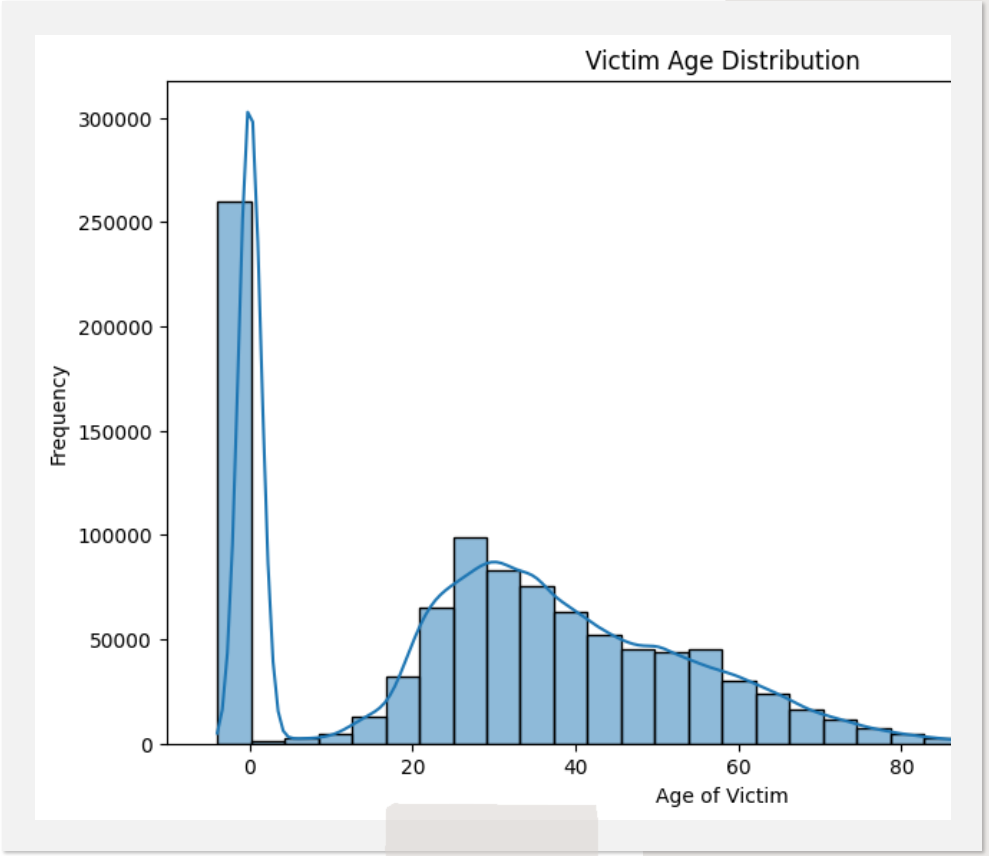
Results - Crime Trends (Yearly)

Key Findings: There is a noticeable increase in crime from **2020 to 2022**, possibly due to external factors like the COVID-19 pandemic. However, crime rates dropped significantly in **2023 and 2024**, suggesting potential improvements in law enforcement or reporting.



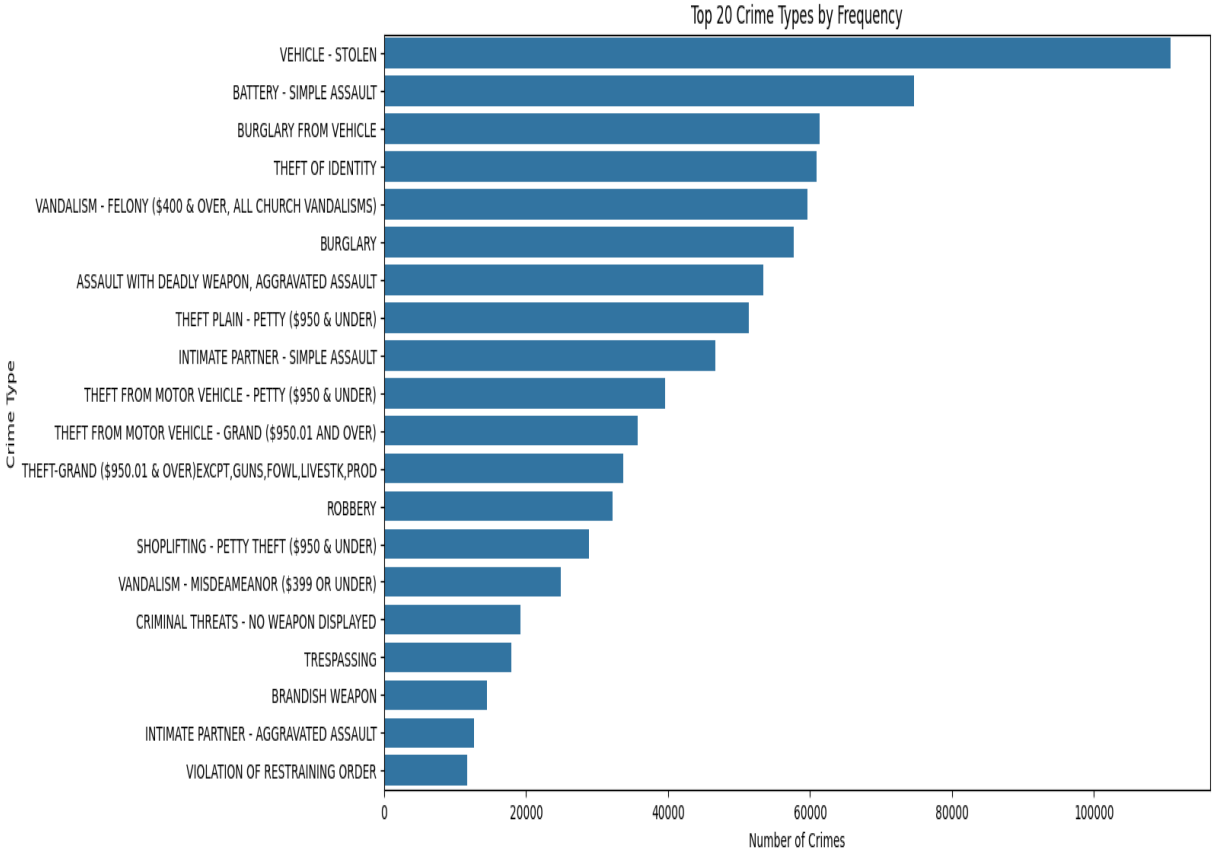
Results - Victim Age Distribution

Key Findings: The highest frequency of crime victims are in the **teen to 30-year-old range**, which could indicate that young adults are more likely to be involved in or targeted by crimes. A large number of victims with **age 0** likely indicates missing or incomplete data.

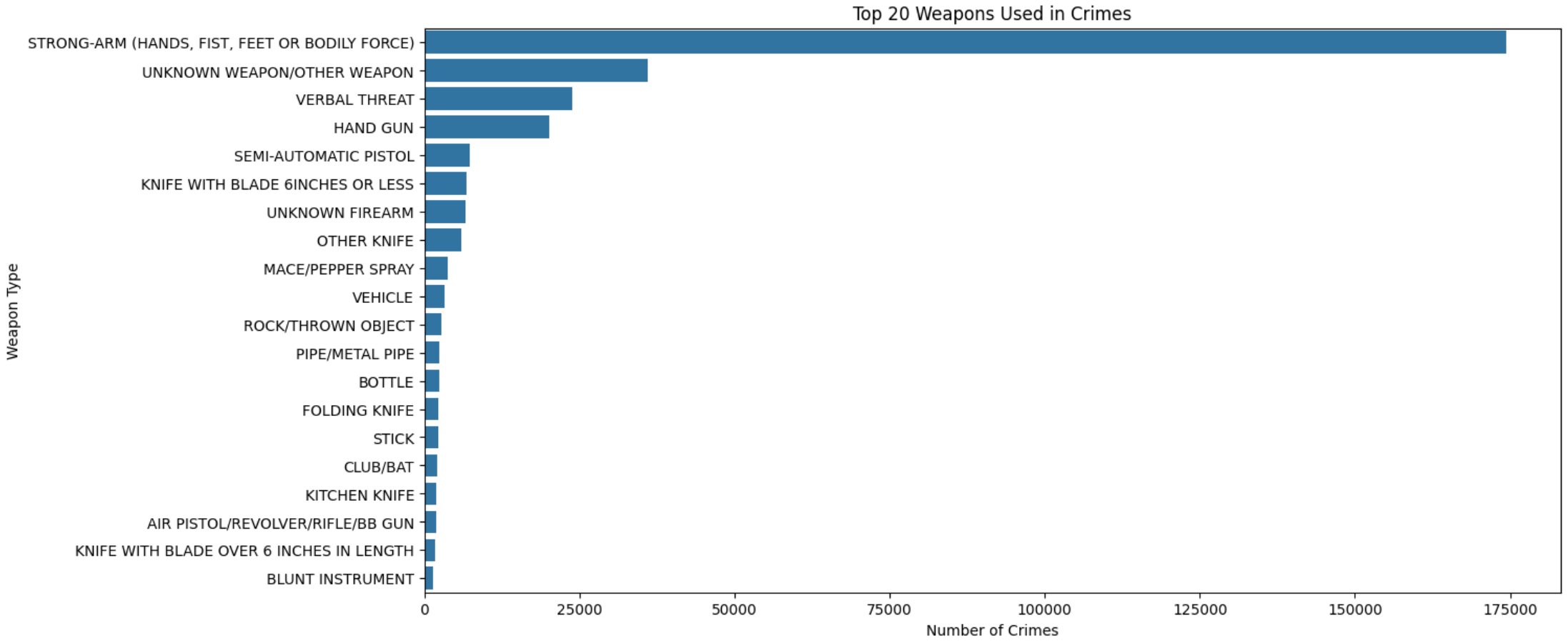


Results - Crime Types and Weapons Used

Key Findings: **Vehicle theft** is the most common crime in this dataset. Other common crimes include **battery (simple assault)**, **burglary from vehicles**, and **vandalism**. These findings highlight the need for targeted intervention in property crimes and violence.

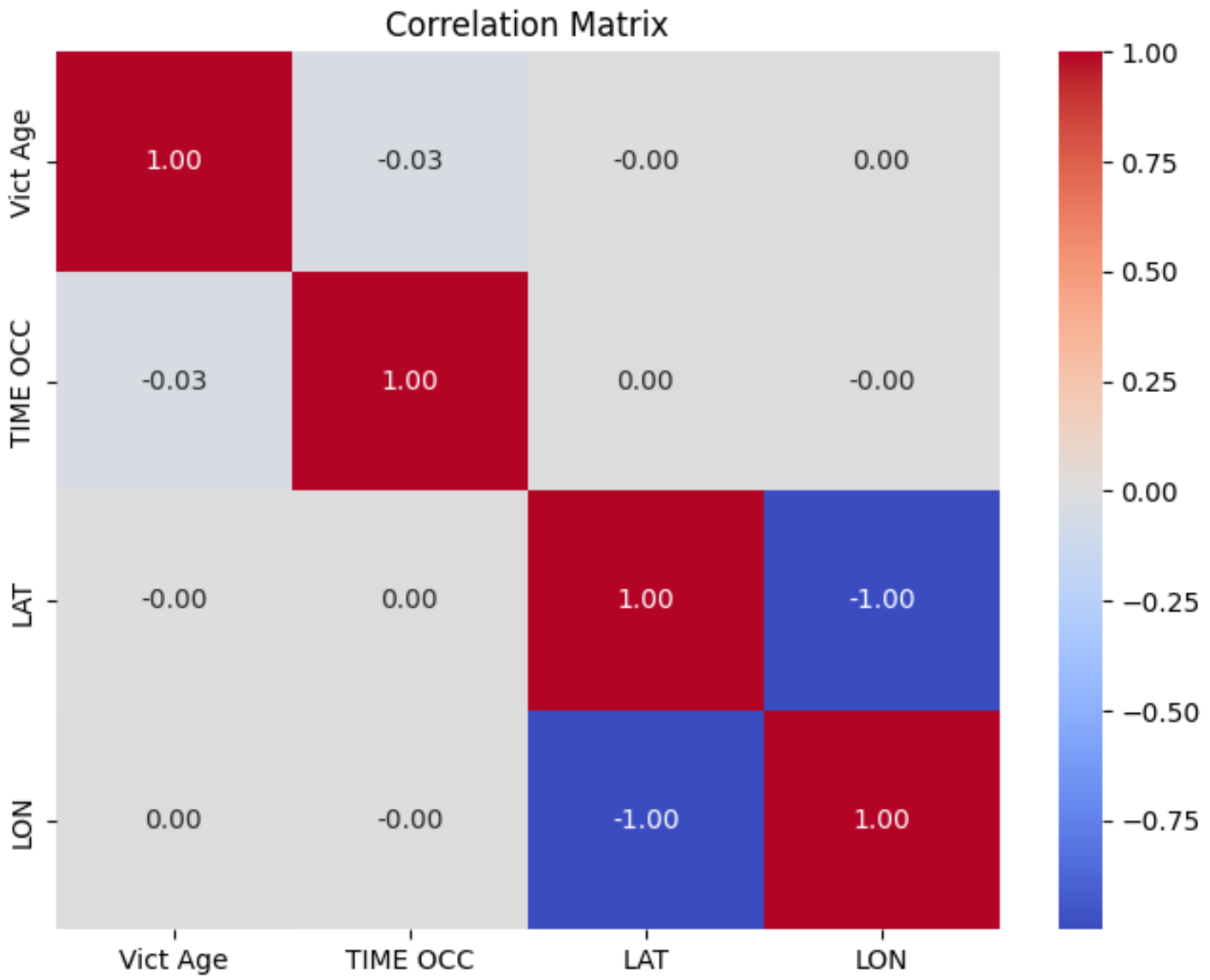


Weapons Used in Crimes

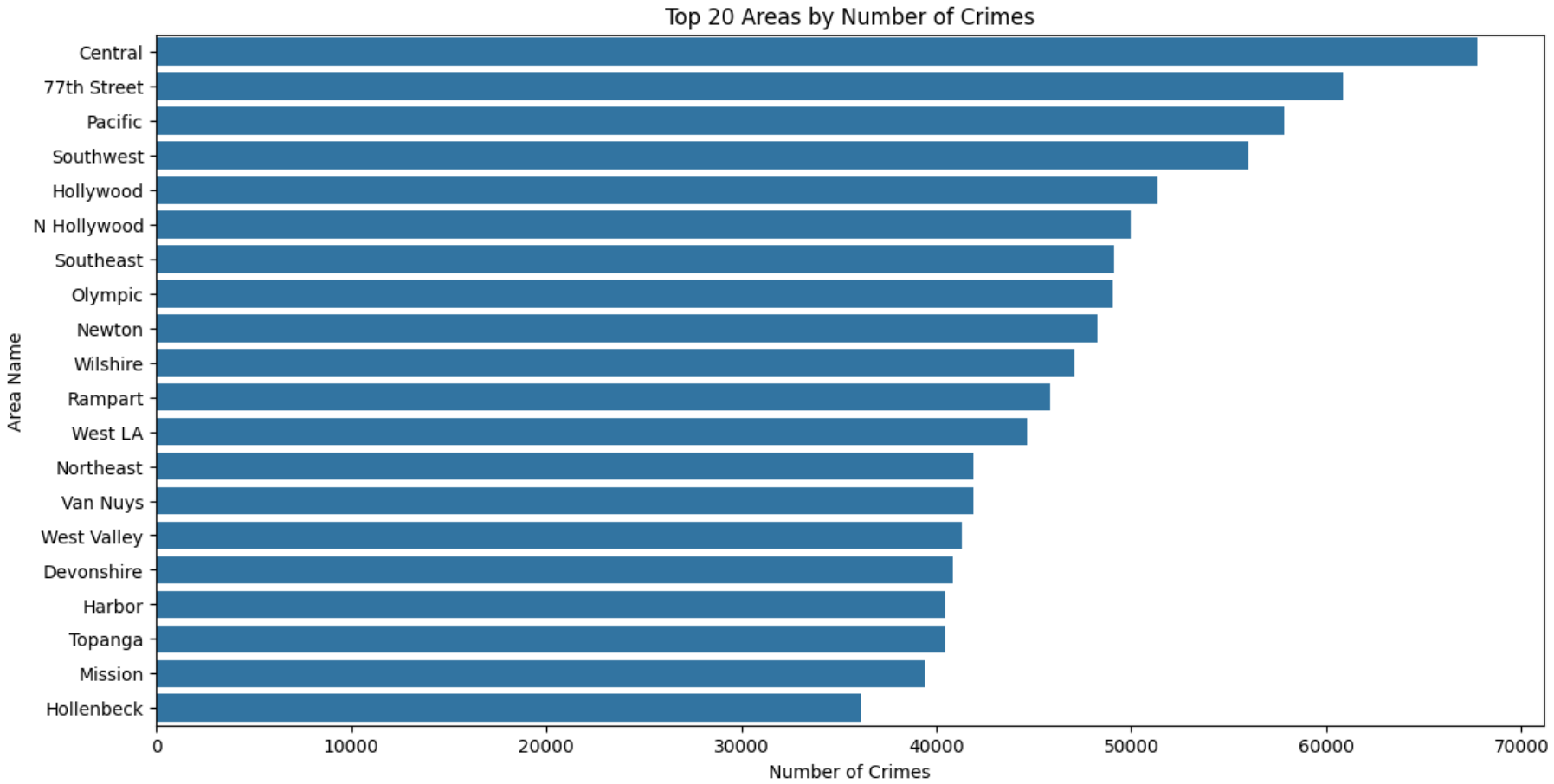


Results - Correlation Matrix

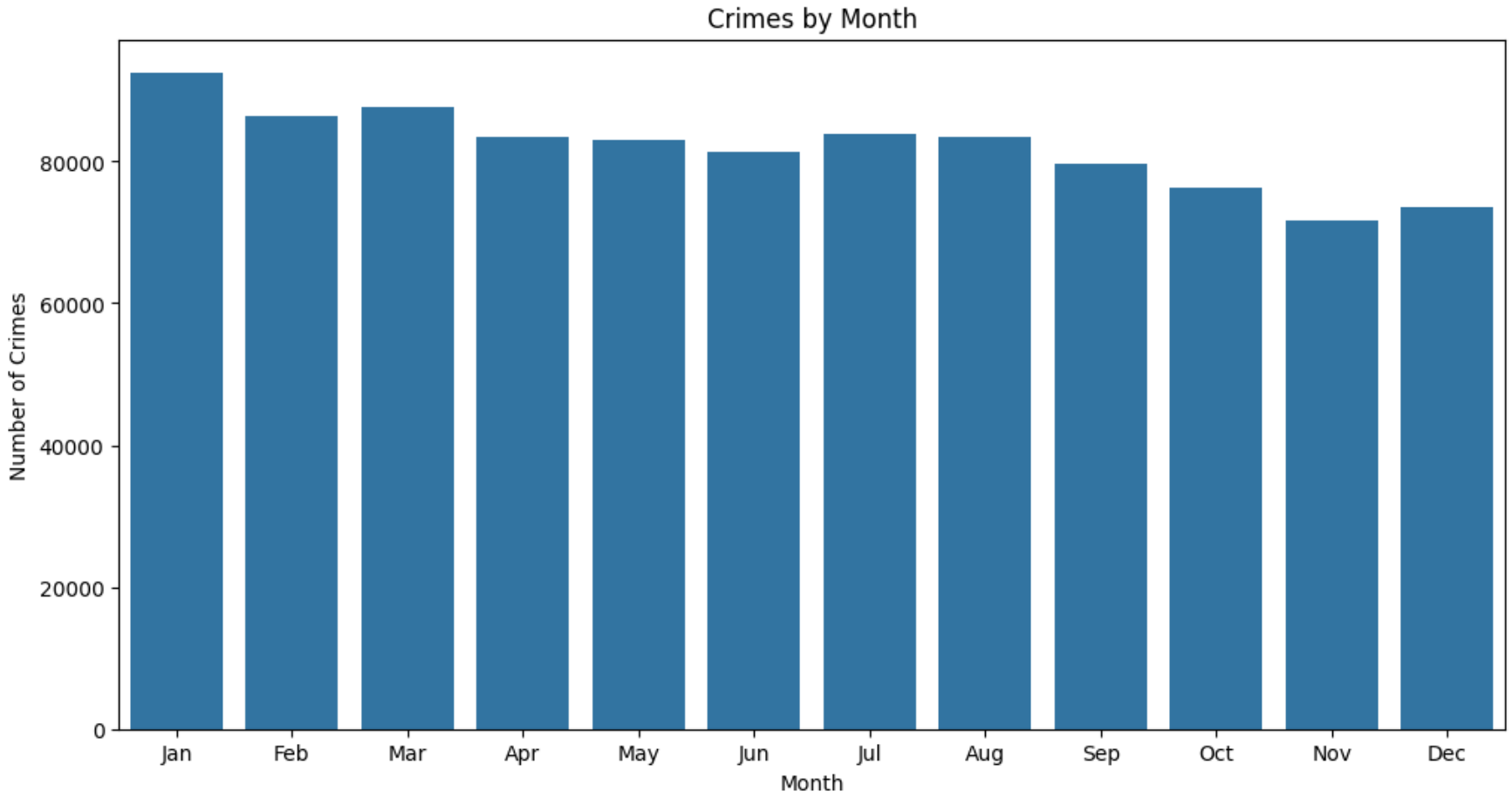
Key Findings: There is no strong correlation between **victim age** and crime **time/location**. However, there is a perfect negative correlation between **latitude and longitude**, which is expected as these represent specific crime locations. This can be used for geospatial analysis of crime hotspots.



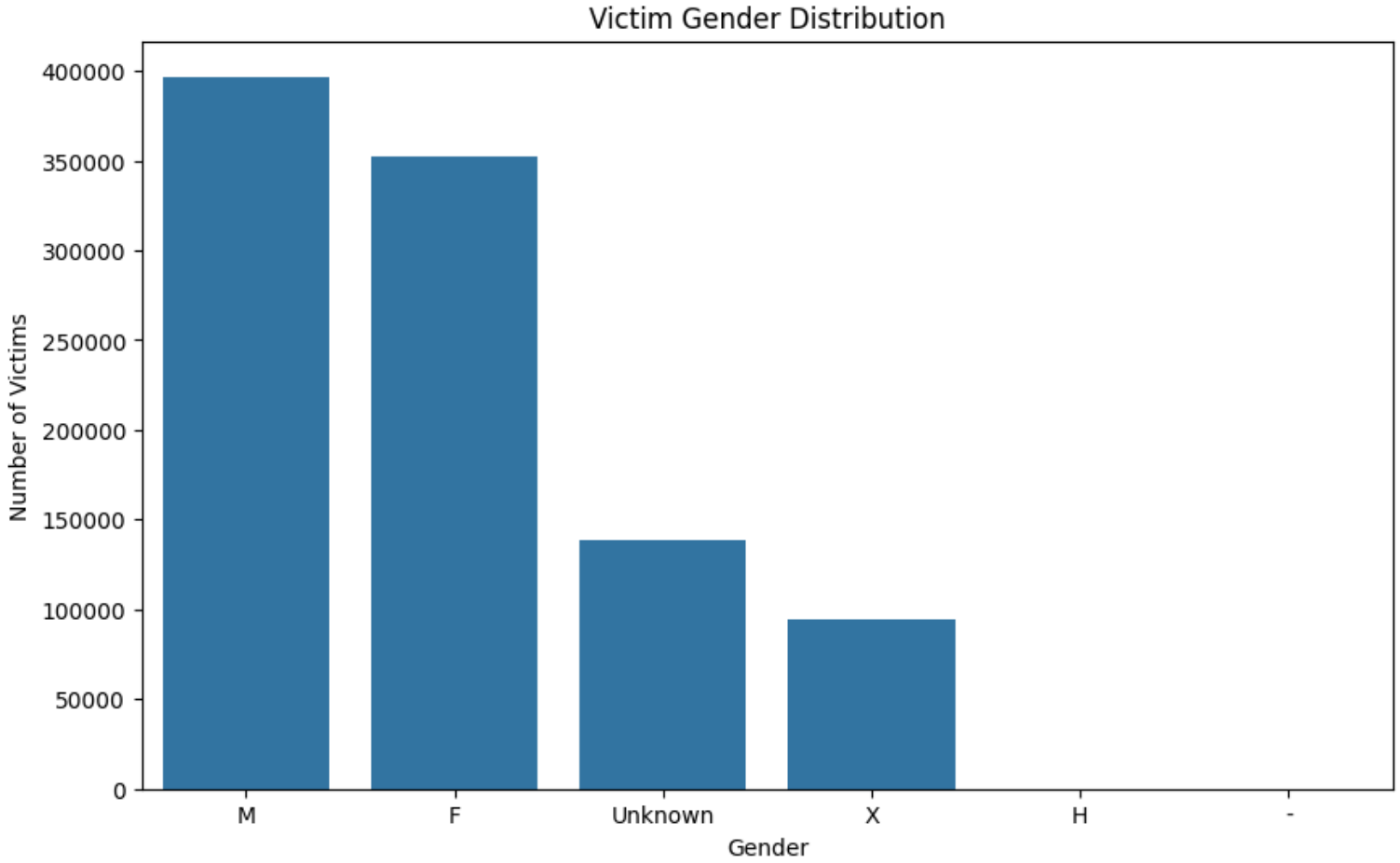
Top 20 areas by Number of Crimes



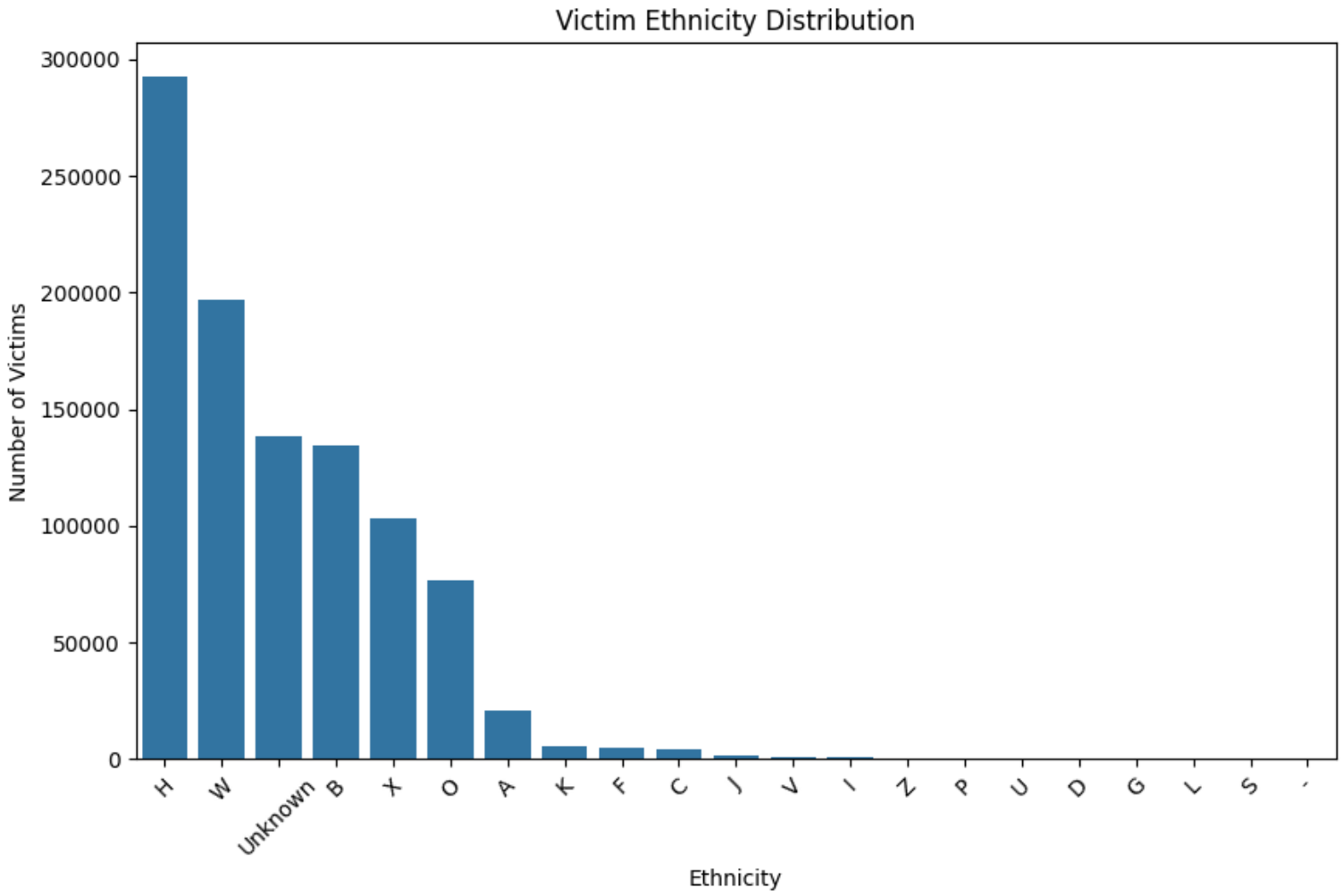
Crimes by Month



Victim Gender Distribution



Victim Ethnicity Distribution



Conclusions

- **Crime trends** show an increase in vehicle theft and other property crimes in urban areas.
- **Victim demographics** indicate a higher number of young male victims, with a significant impact on certain ethnic groups.
- **Weapon analysis** highlights a prevalence of **hands and fists**, followed by **firearms** and **knives** in violent crimes.
- **Geospatial analysis** uncovers specific **crime hotspots**, with a noticeable surge in certain precincts like **Central** and **77th Street**.

Future Work

Implement **predictive models** to forecast future **crime hotspots**.

Expand **data sources** and improve **data quality** for more robust analysis and insights.

Thank You