



# Final Project: Analyzing Crime Data

**Group 8:** Daniel Lee, Pathik Rupwate, Tsengee Sundui, Vamshi Gadepally

## NUVENTIQ

ALL YOUR ANALYTICS SOLUTIONS START HERE



**CONTACT US**

- 123 Foothill Blvd  
Chicago, IL 60610
- [analytics@nuventiq.org](mailto:analytics@nuventiq.org)
- +1 (212) 123 5687

# TABLE OF CONTENTS



01

Executive Summary

02

Data Description

03

Analysis Objectives

04

Methodology

05

Reports & Dashboard

06

Recommendations



# 01

# EXECUTIVE SUMMARY

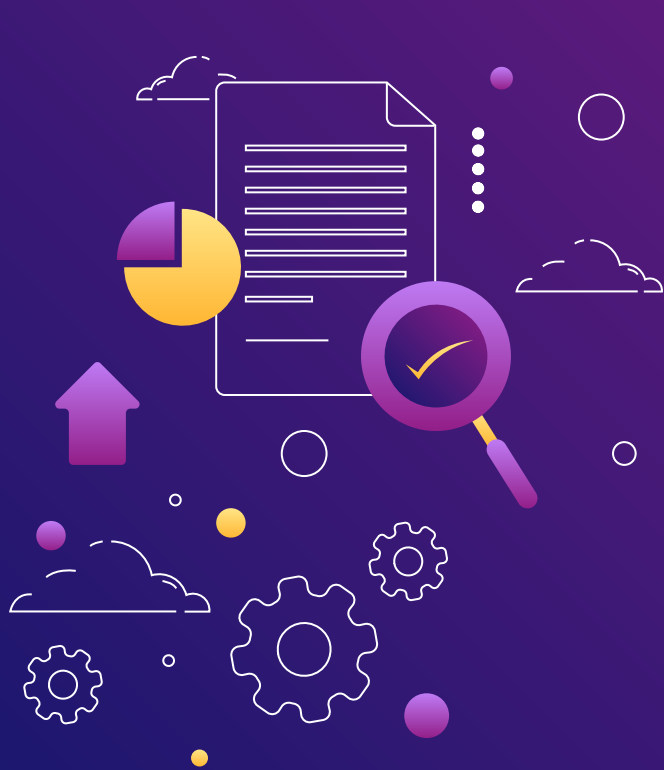
---

Using data of reported incidents of crime which occurred in the City of Chicago **between 2019 and 2022**, we can analyze recent trends in different types of crimes which occurred in different districts of the city.

### **Use to stakeholders:**

The purpose of our project is to enable **Local Communities** and **Public Law Enforcement Agencies of Chicago** make data-driven insights and mitigate Public Security pressures faced in Chicago.

The analyses and visualizations can be used by businesses who are deciding which areas of the city would be most ideal to expand into, as well as by policymakers for the City of Chicago in reference to budget allocations and introduction of new projects.



# 02

## DATA DESCRIPTION

---

# DATA OVERVIEW

- We obtained the **reported crimes** data from the Chicago Data Portal <sup>1</sup>
- We **aggregated the data** over the years to show the overall trend in the number of crimes reported since 2001
- We also chose to analyze a **smaller subset** of the data **between 2019 and 2022**, to extract more recent information and provide relevant recommendations accordingly
  - Chose 2019 as the base year (for pre-COVID comparisons)
- The data contains 22 columns describing each reported incident, with variables such as:
  - Case Number
  - Date
  - Location Description

---

1. <https://data.cityofchicago.org/Public-Safety/Crimes-2001-to-Present/ijzp-q8t2>

---

# DATA PREPARATION STEPS

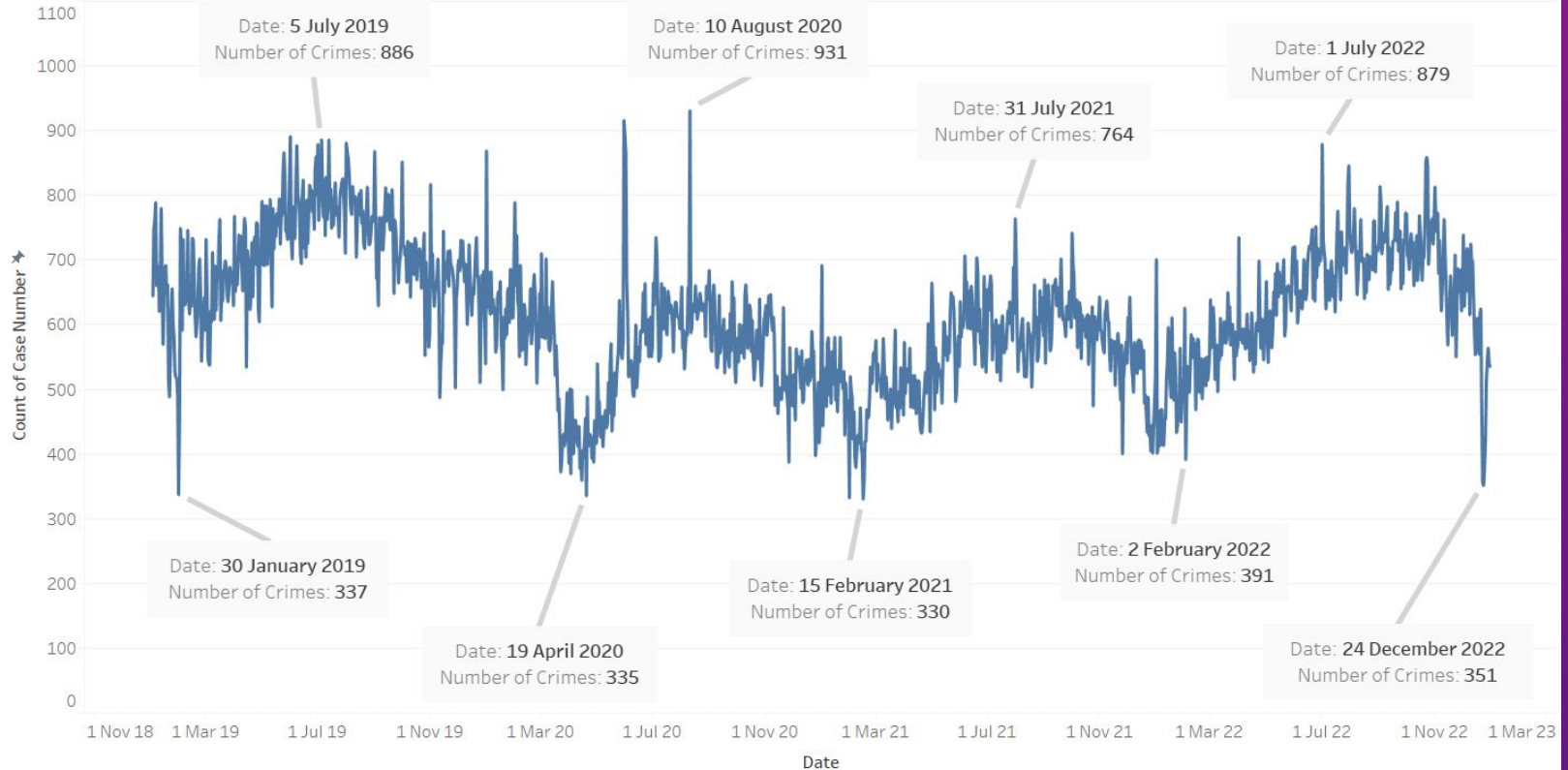
- Removed null values
- Dropped the columns that were not relevant for our analysis. For example:
  - FBI Code
  - Updated On
- Changed column headers to upper case for consistency
- Converted the *Date* column to 'datetime' data type

Given the objective of our analysis, here are some of the key variables:

- **Date**: the date when the incident occurred
  - **Primary Type**: the primary description of the crime type, i.e. 'theft'
  - **Arrest**: boolean variable indicating whether an arrest was made or not
  - **District**: the police district where the incident occurred
  - **Year**
  - **Latitude**
  - **Longitude**
-

# EDA: 2019-2022 CRIME REPORTS TREND

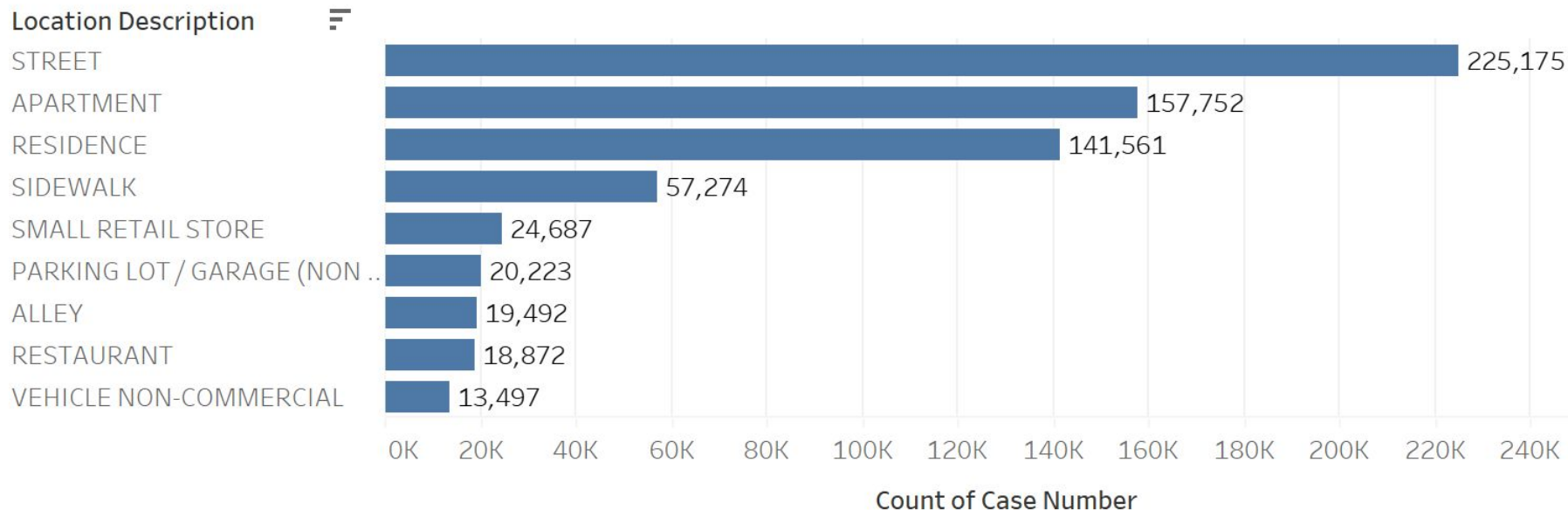
Number of Crimes per Day - 2019 - 2022





# EDA: 2019-2022 CRIME BY LOCATION TYPE

Number of Crimes by Location Description- 2019 - 2022





# 03 ANALYSIS OBJECTIVES

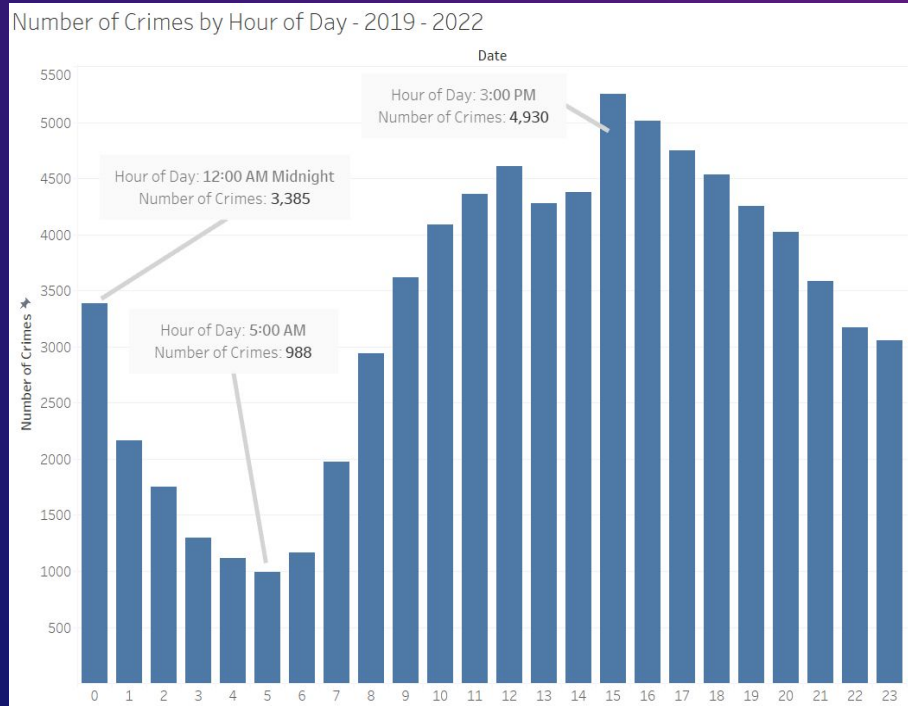
---

## OBJECTIVE: **ENHANCE** THE CITY OF CHICAGO CRIMES DASHBOARD

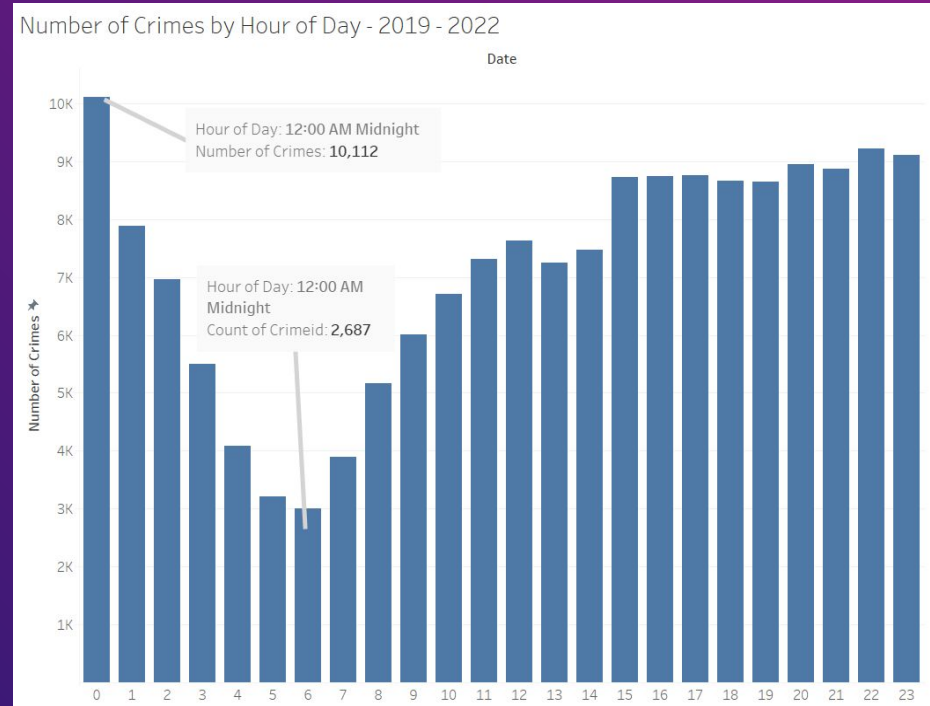
- Show 'time of day'
  - Analyzing the time of day when crimes are committed could help police determine when to allocate resources and where to focus their attention
- More focus on filtering by 'types of crime'
  - Breaking down the types of crimes reported (e.g. burglary, robbery, assault, etc.) would help police identify patterns and target their resources more effectively
- Simplify filters and interactivity of the dashboard so that any interested party can use it with ease

# FOR EXAMPLE: DIFFERENT CRIMES PEAKED AT DIFFERENT TIMES DURING THE DAY

## ASSAULT



## BATTERY



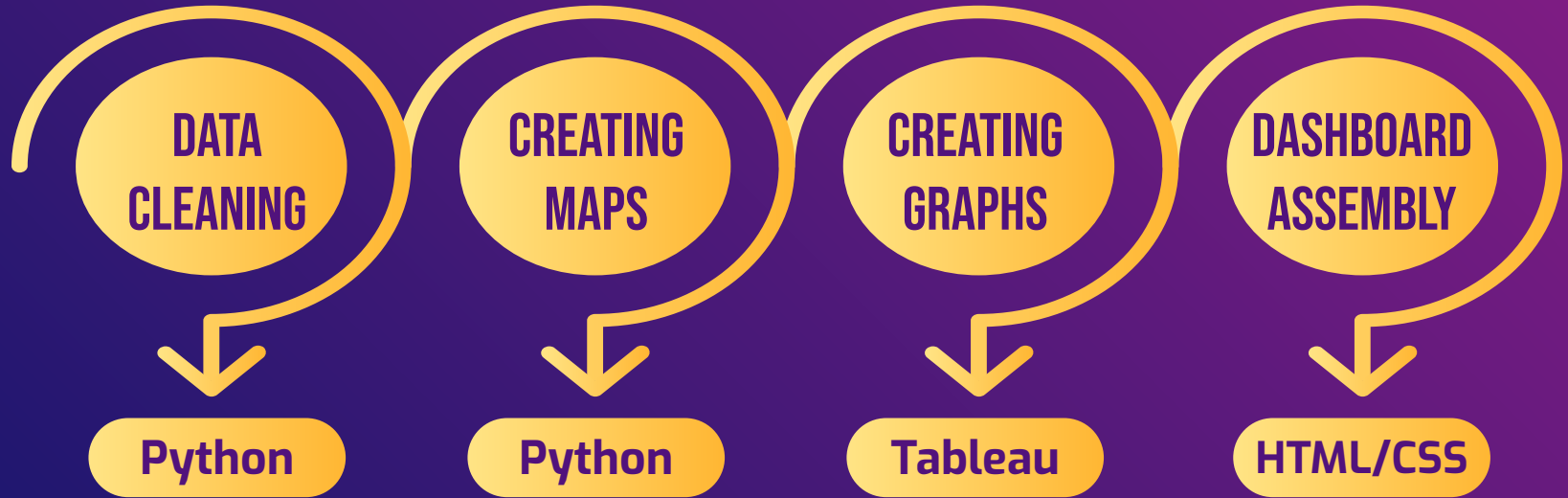


04

# METHODOLOGY

---

# METHODOLOGY



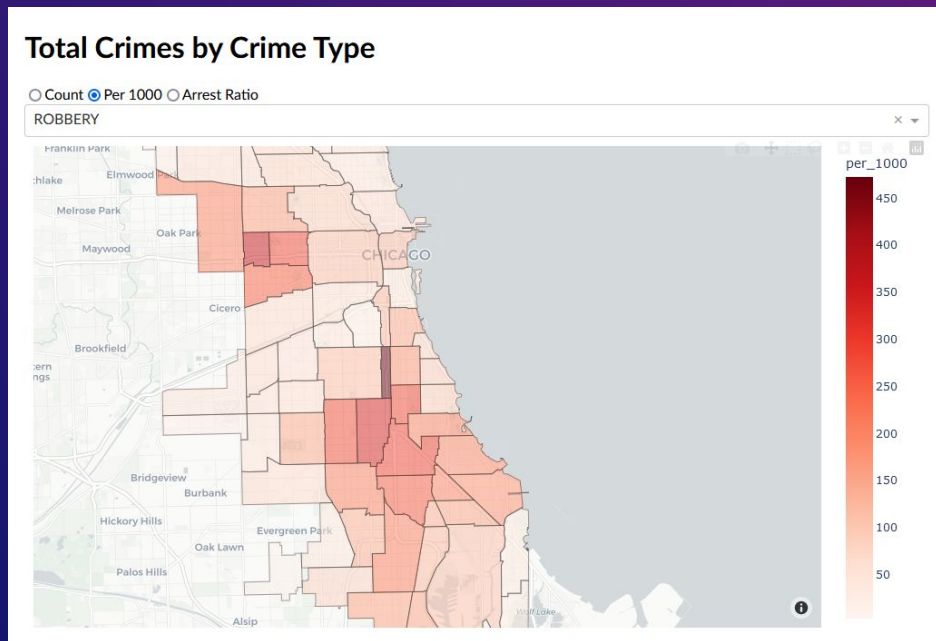


# 05

## REPORTS & DASHBOARD

Our **interactive dashboard** is embedded on the following webpage:  
<http://www.danleedata.com/crimedashboard>

## Dashboard Content: **Total Crimes by Crime Type**

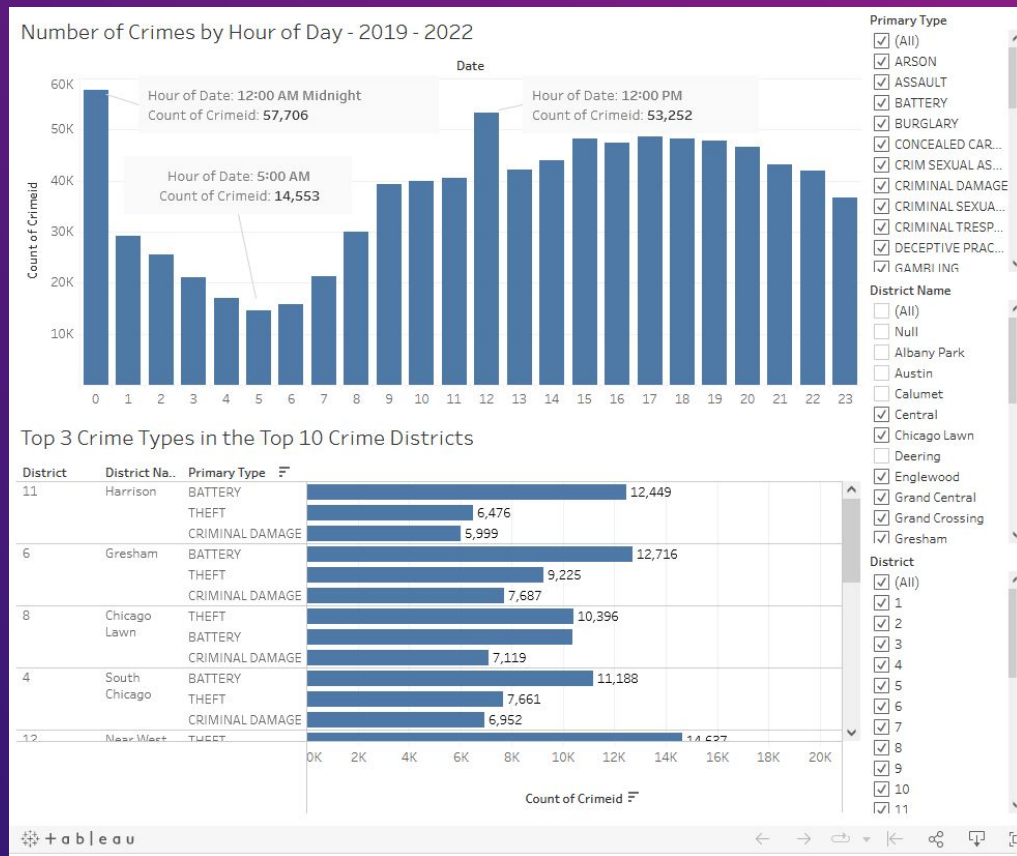


- This is an interactive map showing different community areas
  - Hover over the area to see the neighborhood name
- Filter by:
  - total number of reports
  - reports per 1000
  - arrest ratio



# Dashboard Contents: Number of Crimes by Hour of Day & Top 3 Crime Types in the Top 10 Crime Districts

- Number of Crimes by Hour of Day (2019 - 2022 data)
  - This interactive plot can be filtered by crime type
  - The first bar represents all the incidents which occurred an hour after midnight, the second bar between 1-2 AM and so on
- Top 3 Crime Types in the Top 10 Crime Districts (2019 - 2022 data)
  - This interactive plot can be filtered by district name/number



# Dashboard Content: Crime Trends



This interactive visualization shows Crime Trends over time (since 2001)

- We can filter by:
  - crime type
  - neighborhood
  - different time periods (slider)
- We can compare trends between different neighborhoods
  - For example, we can see that the Loop had higher number of incidents overall than Humboldt Park



# 06

## INSIGHTS & RECOMMENDATIONS

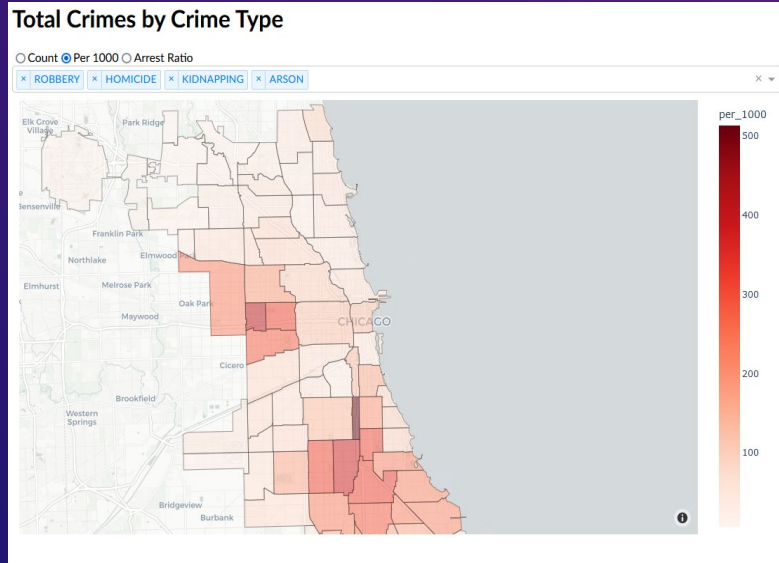
---

## EXPLORATORY DATA ANALYSIS **INSIGHTS**

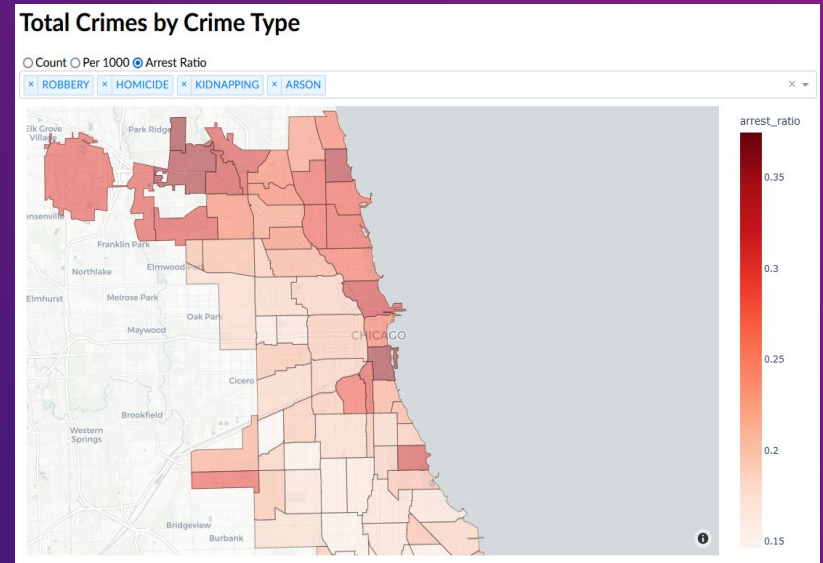
- Chicago witnesses highest counts of Crime in Summer and Autumn months, with 10th Aug 2020 having the highest number of crimes (931) and 15th Feb 2021 having the lowest (330)
  - Most Crimes in Chicago occur between 5pm - 1am with a peak at around 12 am and witnesses least crimes at 5 am and early morning times
  - Most crimes take place on the streets of Chicago followed by indoor places of residence like Apartments
  - Theft, Battery, Criminal Damage and Assault account for the majority of crimes that take place in Chicago
  - The most common types of Crime are reported across all parts of Chicago, with Central, Southern and Western districts being particular Hotspots
  - Harrison, Gresham, Chicago Lawn, and Near West districts witness the highest number of crimes with Physical Assault and Theft on Streets and in Apartments being the most common
-

# HOT SPOT NEIGHBORHOODS: FILTERED BY ROBBERY, HOMICIDE, KIDNAPPING & ARSON

High Violent Crimes - Reports per 1000

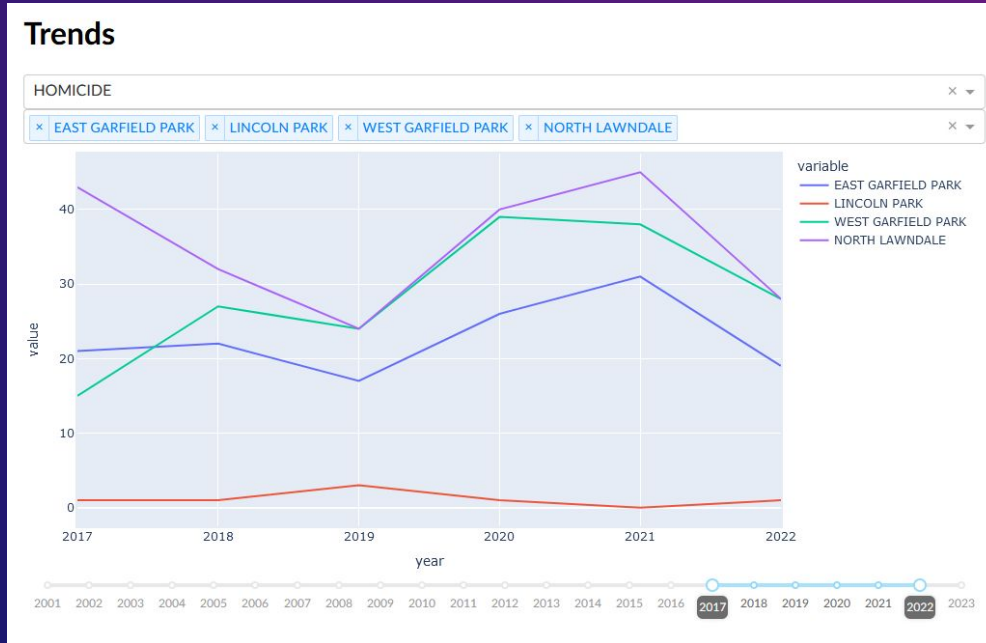


High Violent Crimes - Arrest Rate



- High violent crime rates are not correlated with their arrest rates in Chicago neighborhoods
- This indicates that there are not enough resources being deployed to these areas
- We also see a trend of neighborhood crime “leaking” to adjacent neighborhoods due to similar socioeconomic factors as well as proximity

# HOMICIDE RATES OVER TIME: IN 3 HIGH-CRIME NEIGHBORHOODS VS. LINCOLN PARK



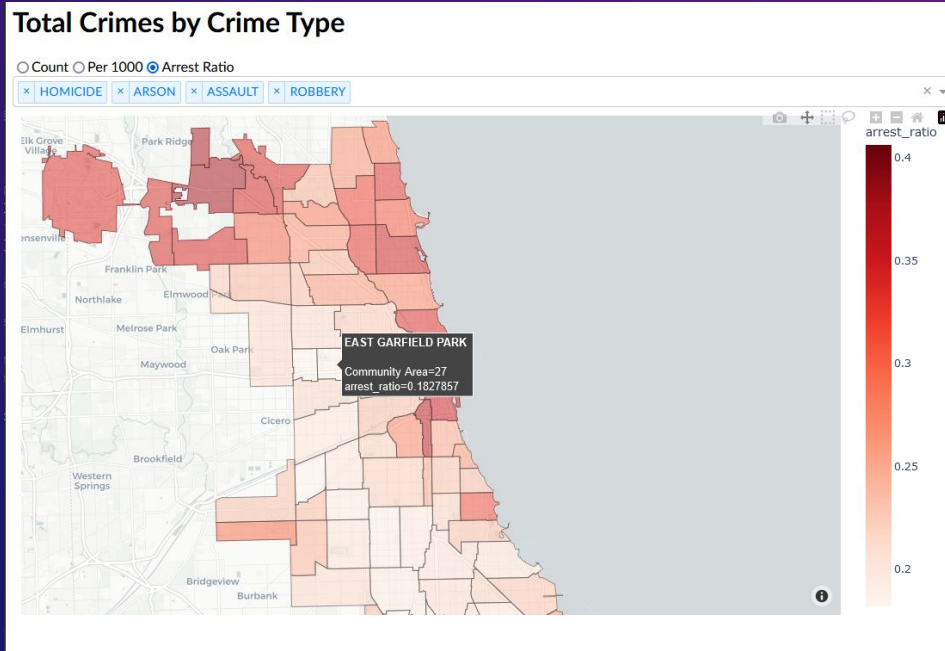
In North Lawndale, East and West Garfield Park, homicide rates dropped until 2019, increased between 2019-2021, after which they began to decline again

However, the homicide rate in these neighborhoods are still relatively high, especially compared to neighborhoods such as Lincoln Park

Suggestion for local businesses: wait to see if the downward trend in crime rate continues for longer before considering expanding into these “hot-spot” neighborhoods



# HIGH-CRIME & LOW-ARREST NEIGHBORHOODS: RECOMMENDATIONS



## Short-term recommendations:

- Divert and/or increase investigative resources to neighborhoods with high violent crime and lower arrest ratios
- Ask the public to pay more attention to safety in Summer and Autumn

## Long-term recommendations:

- Increase investments in street outreach programs to improve effectiveness
- Increase investments in youth programs in neighborhoods and surrounding areas
- More patrolling at night (5pm - 1am) especially in the South and the Central districts of Chicago

# APPENDIX





# DATA SOURCE

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

Here are the 22 columns reported in the data:

ID	12874113	Arrest	True	Y Coordinate	1902985
Case Number	JF452213	Domestic		Year	2022
Date	10/27/2022 11:37:00 PM	Beat	1831	Updated On	11/03/2022 04:47:01 PM
Block	001XX W KINZIE ST	District	018	Latitude	41.889179438
IUCR	0460	Ward	42	Longitude	-87.633040334
Primary Type	BATTERY	Community Area	8	Location	
Description	SIMPLE	FBI Code	08B		
Location	STREET	X Coordinate	1174929		
Description					