

# A Glimpse into the Patterns in Crime in Los Angeles

*- Review of L.A. crime incident log - 2020 to 2024*

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# Research Objective – What do we want to find out?

- Background:
  - In recent years, residents of California and elsewhere across the U.S. have expressed concern that the crime rate is increasing, particularly since the COVID-19 pandemic.
- Research Objective:
  - Descriptively test hypotheses related to public observations:
    - Did petty crimes indeed increase in recent years?
    - Did burglaries from vehicles indeed surge as well?
  - Outcome based questions / exploration:
    - Any patterns associated with the time of the crimes?
    - What are the major crime types and the YoY trend of total crime by area?
    - What are the highest crimes and their YoY trend, by area?
    - Which areas have seen the highest number of crimes with firearms?
- Potential Benefit:
  - Highlights trends, patterns & insights that could be of help to local law-enforcement
- Data: [City of Los Angeles – Crime Data from 2020 to Present](#)

# Exploratory Data Analysis (EDA)

## Primary information of the dataset:

- Shape: 910,707x28
- Data types check needed: date, time, mixed type fields

```
The primary information of the dataset:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 910707 entries, 0 to 910706
Data columns (total 28 columns):
#   Column              Non-Null Count  Dtype
---  ---
0   DR_NO               910707 non-null  int64
1   Date Rptd          910707 non-null  object
2   DATE OCC           910707 non-null  object
3   TIME OCC           910707 non-null  int64
4   AREA               910707 non-null  int64
5   AREA NAME          910707 non-null  object
6   Rpt Dist No        910707 non-null  int64
7   Part 1-2           910707 non-null  int64
8   Crm Cd             910707 non-null  int64
9   Crm Cd Desc        910707 non-null  object
10  Mocodes            783696 non-null  object
11  Vict Age           910707 non-null  int64
12  Vict Sex           789672 non-null  object
13  Vict Descent       789663 non-null  object
14  Premis Cd          910697 non-null  float64
15  Premis Desc        910153 non-null  object
16  Weapon Used Cd     315247 non-null  float64
17  Weapon Desc        315247 non-null  object
18  Status             910707 non-null  object
19  Status Desc        910707 non-null  object
20  Crm Cd 1           910696 non-null  float64
21  Crm Cd 2           66335 non-null   float64
22  Crm Cd 3           2237 non-null    float64
23  Crm Cd 4           64 non-null      float64
24  LOCATION           910707 non-null  object
25  Cross Street       143332 non-null  object
26  LAT                910707 non-null  float64
27  LON                910707 non-null  float64
dtypes: float64(8), int64(7), object(13)
memory usage: 194.5+ MB
```

## Null value summary by features:

- Additional crime type information missed the most

```
Null value summary:
Crm Cd 4      910643
Crm Cd 3      908470
Crm Cd 2      844372
Cross Street   767375
Weapon Used Cd 595460
Weapon Desc    595460
Mocodes        127011
Vict Descent   121044
Vict Sex       121035
Premis Desc    554
Crm Cd 1       11
Premis Cd      10
LAT            0
LOCATION        0
Status Desc    0
Status         0
DR_NO          0
Date Rptd      0
Vict Age       0
Crm Cd Desc    0
Crm Cd         0
Part 1-2       0
Rpt Dist No    0
AREA NAME      0
AREA           0
TIME OCC       0
DATE OCC       0
LON            0
dtype: int64
```

## All entries can be uniquely identifiable by division record

```
DR_NO
190326475    1
221908151    1
231105297    1
221008844    1
200320258    1
..
240405919    1
240905054    1
241605414    1
241605270    1
240104953    1
Name: count, Length: 910707,
```

## Some potential invalid values found in Victim age and Victim sex

```
Vict Age
0      229674
30     20613
35     20236
31     19705
29     19667
...
97         67
-2         17
-4          3
-3          2
120         1

Vict Sex
M    373417
F    332804
X     83347
H     103
-          1
```

## Data Cleanup:

- Change the type of 'DATE OCC' and 'Date Rptd' to datetime format.
- change 'TIME OCC' to 24-hr military style first, then into datetime format.
- Drop irrelevant columns
- To avoid dropping too many entries unnecessarily, we will drop entries with invalid value when a given features is used (such as Victim age/sex)
- Ending dataset shape: 910,707x9



# Descriptive Hypothesis Tests

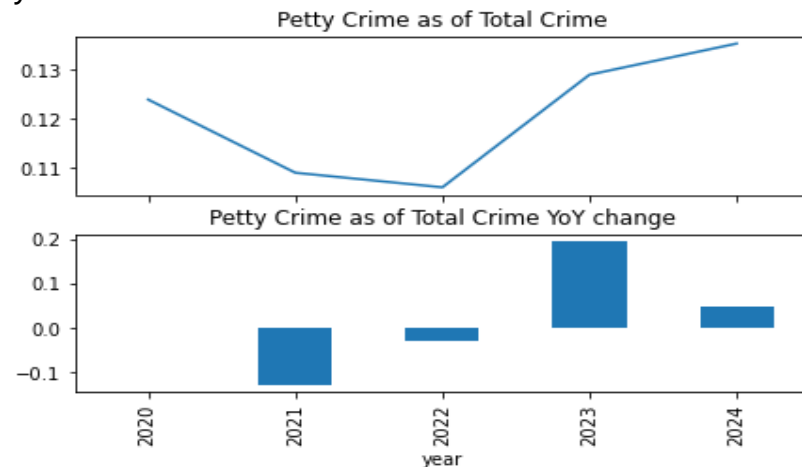
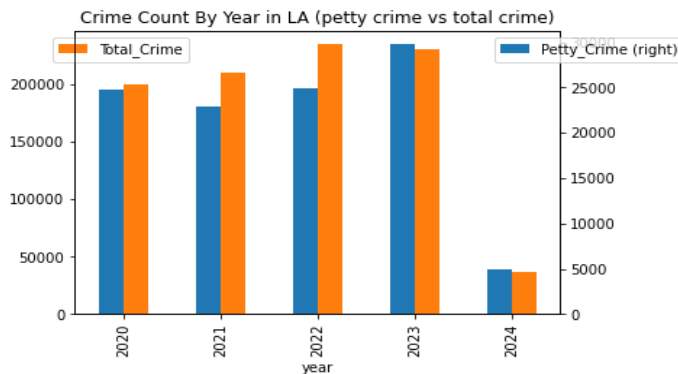
*The following section contains hypothesis testing based on descriptive analytics*

# Descriptive Hypothesis Tests - I

## Hypothesis One:

- ❑ **Petty crimes\*** in Los Angeles increased meaningfully in recent years – does our data support it?
- ❑ **Analysis:** looked at the counts of petty crime, total crime, and petty crime as % of total crime trends.
- ❑ **Findings:** both crime counts increases over the years, but as a % of total crime, petty crime **increase** meaningfully in 2023.
- ❑ **Conclusion:** data may **support** the hypothesis

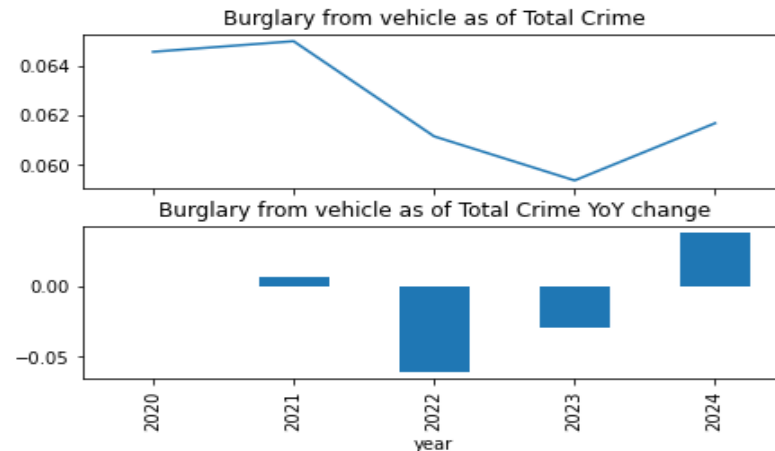
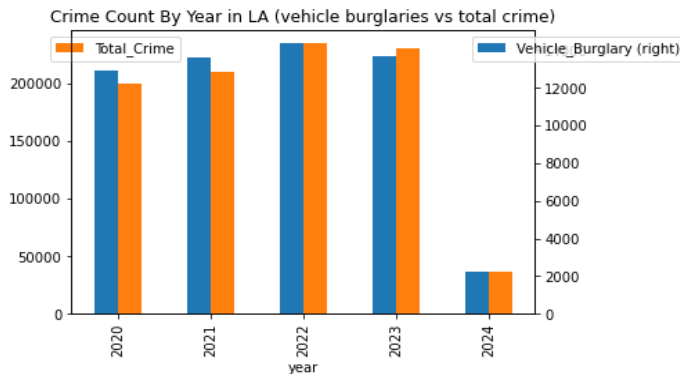
\*Petty crimes: defined as those with an economic loss of <\$950 by law



# Descriptive Hypothesis Tests - II

## Hypothesis Two:

- ❑ **Burglaries from vehicles ('BV') increased meaningfully in recent years** – does our data support it?
- ❑ **Analysis:** looked at the counts of BV, total crime, and BV as % of total crime trends.
- ❑ **Findings:** BV crime stayed relatively stable, and as a % of total crime, BV crime **decreased** in recent full years.
- ❑ **Conclusion:** data may **not** support the hypothesis





# Outcome Based Question

*The following section contains some descriptive analysis to glean insights.*

# Q1 – Time Patterns in Crime

Is there any pattern associated with the time of the day, the day of a month, or the Month of a year?

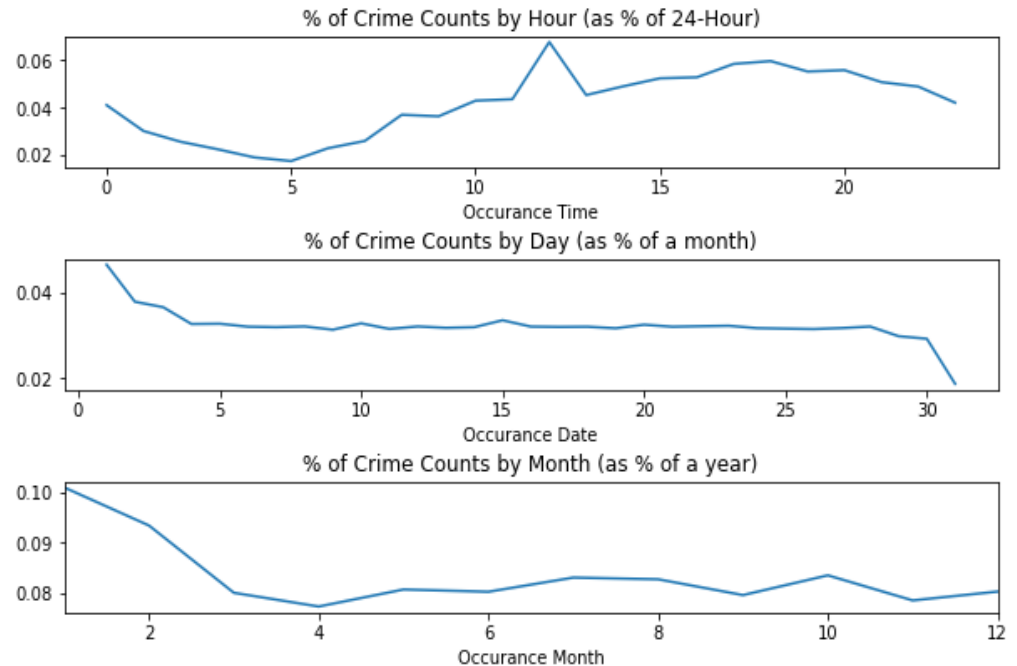
## Analysis:

- Utilizing the date and time data, looked for any pattern of crime counts within a window of a day, a month and a year.

## Findings:

- Late afternoon and evening tend to have the highest crime rate of a day.
- The first five days of the month tend to have a higher crime rate while the month end tends to have a lower crime rate.
- January – February has a notably higher rate than the rest of the year.

**Implication:** Help agencies to effectively allocate resources for periodic surges in crimes.





# Q2 – Highest Crime in LA

## What are the major incidents of crime in LA?

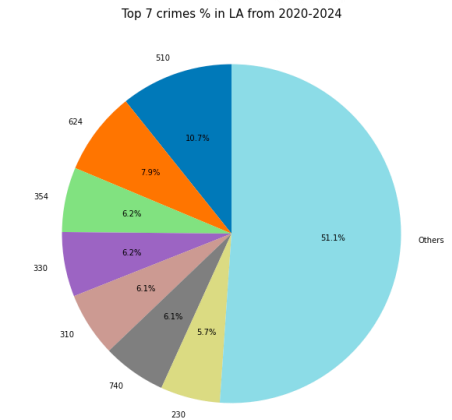
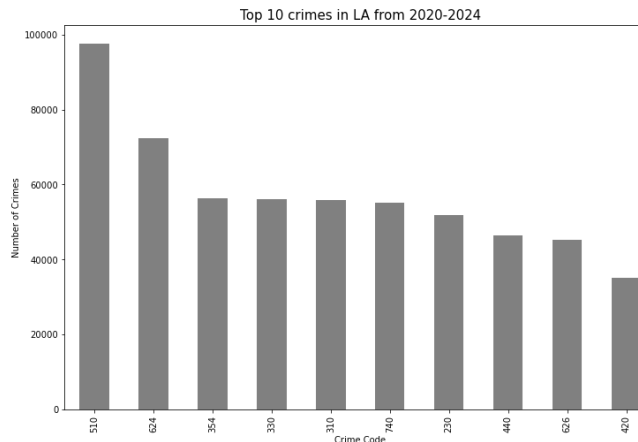
### Analysis:

- Ranking the top 15 crimes by count since 2020, and calculated their contribution to the % of total crimes in LA.

### Findings:

- Vehicle Theft (Cd 510) is the highest crime in LA – **10.73%** of all crimes – 2020 –24.
- Highest 7** Crime Codes make up almost **50%(48.9%)** of all crimes in LA. (Top 10 – ~62%.)

**Implication:** Help law enforcement with planning and budgeting for crime prevention of these crime codes to meaningfully bring down crime rate.



Top 10 crimes in LA from 2020-2024			
Crm Cd	Crm Cd Desc	Crime Count	Percent of Total
510	VEHICLE - STOLEN	97716	10.73
624	BATTERY - SIMPLE ASSAULT	72353	7.94
354	THEFT OF IDENTITY	56254	6.18
330	BURGLARY FROM VEHICLE	56134	6.16
310	BURGLARY	55862	6.13
740	VANDALISM - FELONY (\$400 & OVER, ALL CHURCH VANDALISMS)	55219	6.06
230	ASSAULT WITH DEADLY WEAPON, AGGRAVATED ASSAULT	51788	5.69
440	THEFT PLAIN - PETTY (\$950 & UNDER)	46432	5.10
626	INTIMATE PARTNER - SIMPLE ASSAULT	45277	4.97
420	THEFT FROM MOTOR VEHICLE - PETTY (\$950 & UNDER)	35036	3.85

# Q3 - Total Crime Trend by Division

What has been the YoY trend in crimes reported in each LAPD Division?

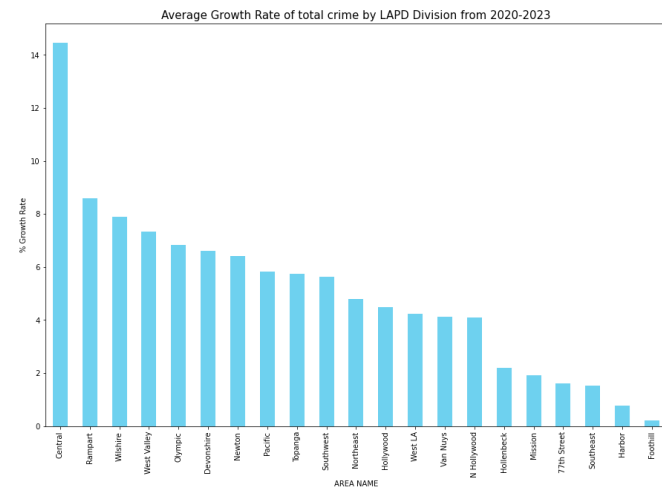
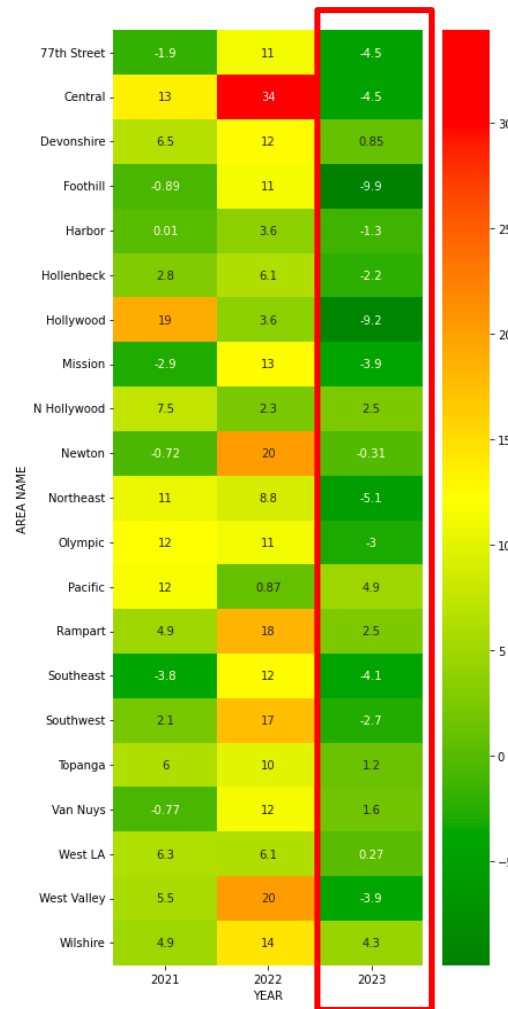
## Analysis:

- Listed the Total Crimes by area between 2020-2023 and the % YoY change

## Findings:

- Between 2021-22, Central LAPD division saw a 34.4% spike, while Newton & West Valley saw a 20% increase.
- Crime has reduced in all LAPD Divisions in 2023, except Devonshire, N-Hollywood, Pacific, Rampart, Topanga, Van Nuys & Wilshire.

**Implication:** Help law enforcement with doubling down on measures that have led to the decline in 2023.



# Q4 – Crime Pattern by Area

Is there any relationship between the type of crime and the areas? (20 LAPD divisions)

- What is the highest crime recorded in each LAPD division?
- YoY trend in Vehicle thefts?

## Analysis:

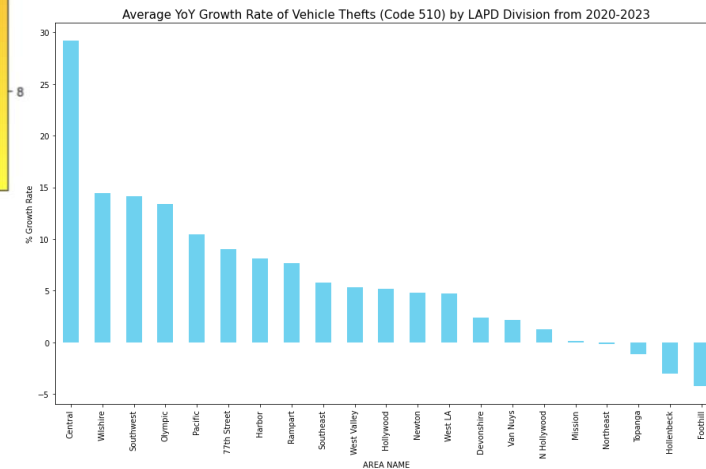
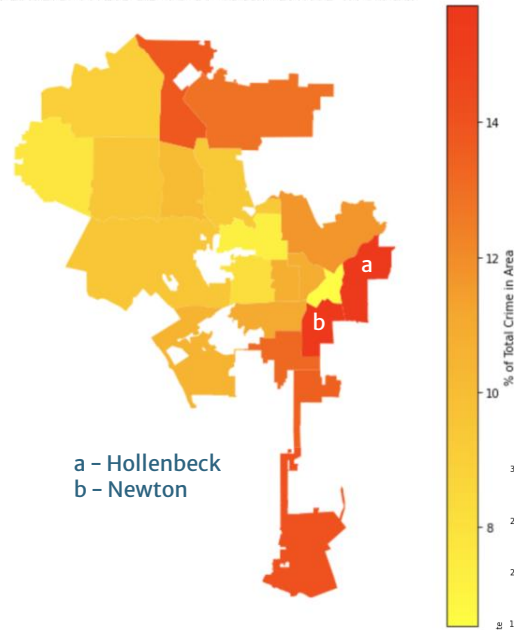
- Mapped the top 5 crimes by crime code in each area as % of total.
- Summarizing average growth rate in stolen vehicles (Cd 510) YoY by area

## Findings:

- VEHICLE-STOLEN is the highest crime in 14 divisions
- **16%** of all crimes in **Newton & Hollenbeck** is a stolen vehicle.
- **Central** – highest avg YoY growth – ~30%.
- Foothill, **Hollenbeck** & Topanga divs have shown an avg YoY decline.

**Implication:** Resource allocation for **Central** LAPD Div. Crime prevention practices from **Hollenbeck** & Foothill Div could be shared with others.

Vehicle Theft as % of Total Crime in Area



# Q5 – Crimes with Firearms

Is there any relationship between crimes with firearms and LAPD Divisions?

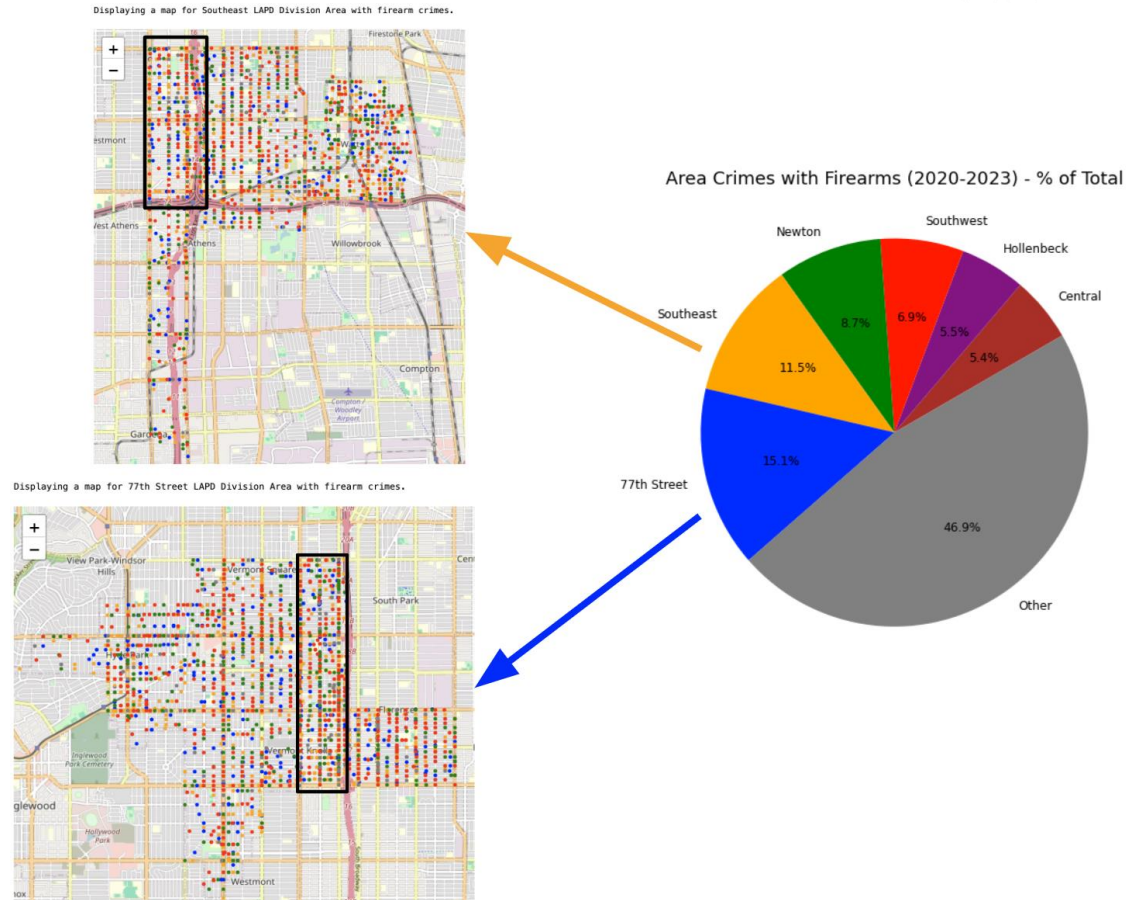
## Analysis:

- Summarized crimes with firearms in each area and as a % of total firearm crimes in LA from 2020–2023.

## Findings:

- The highest 6 LAPD Divisions recorded 53% of all firearm crimes.
- 77th Street and Southeast have the highest and make up 26.49% of crimes with firearms in LA.
- 5 blocks grid (area outlined in map), between S Vermont Ave, Harbor Freeway and Century Freeway has the highest density of crimes with firearms.

**Implication:** Resource allocation and equipment for 77th Street and Southeast LAPD Divisions.



# Key Takeaways

## Key findings:

- Data supports that petty crime in LA has increased in recent years, but doesn't support the notion that burglaries from vehicles have increased
- Late afternoon and evening, the first five days of the month, and the months of January to February have a higher crime rate, in a day/month/year respectively.
- Between 2022-2023 total crime has reduced in all LAPD Divisions except these 7 divisions – Devonshire, N-Hollywood, Pacific, Rampart, Topanga, Van Nuys & Wilshire.
- Vehicle Theft (Crm Cd 510) is the highest crime in LA.
  - Central division has the highest YoY growth rate between 2020-2023
  - 16% of all crimes reported in Newton & Hollenbeck LAPD divisions is a Stolen Vehicle.
  - However Hollenbeck has show avg YoY decline and potentially has effective prevention strategies.
- 6 LAPD Divisions recorded 53% of all firearm crimes in LA.
  - 77st St & Southeast LAPD division have the highest occurrence and make up 26.5%.

**Limitations of the Study:** It's a descriptive analysis without statistical inference, by design. Primarily serves as a starting point for any further research.