Predicting Crime Resolution

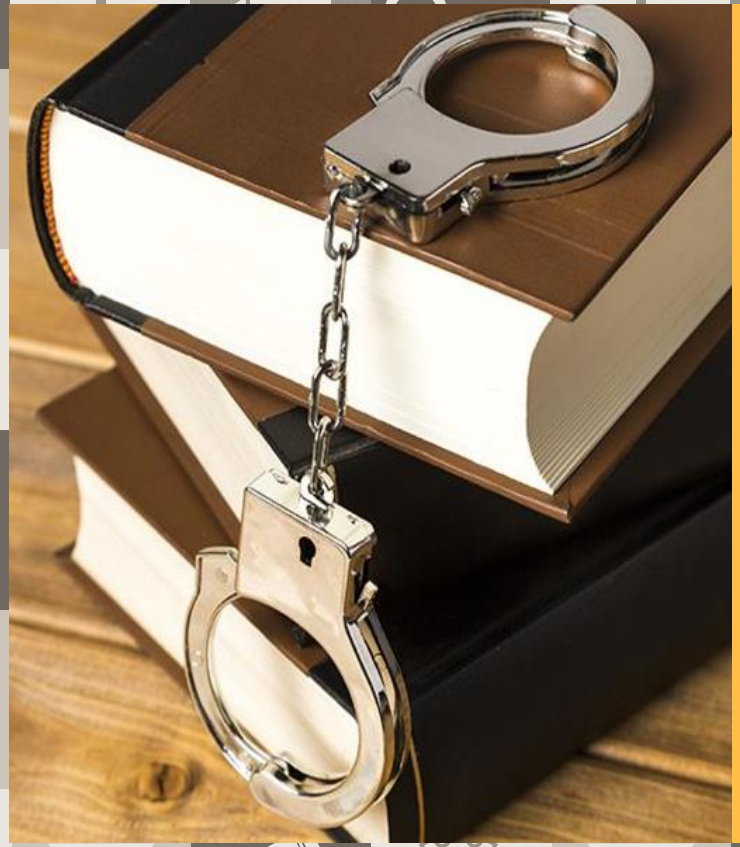
LOS ANGELES

ABSTRACT 209

Have you ever WITNESSED a crime?

Or been the VICTIM of a crime?

Were you WORRIED about justice being served?



Introduction

- Leveraged the power of **data**
- Identify **determining** factors
- Build **predictive model**
- Case by case **resolution probability**
- **Victim Support** and **Policy Implications**

Motivation

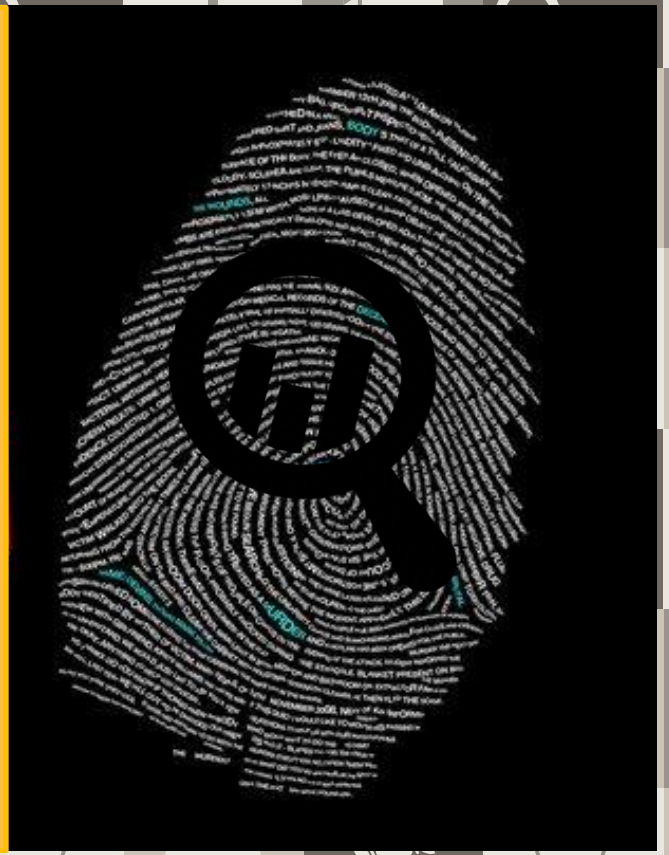
Article published on **June 23, 2023**
Nearly Half of US Murders go Unsolved as cases Rise

CBS NEWS

Article published on **February 27, 2023**
Far From Justice
“Homicide clearance rates[…] have reached to an all-time low of 50% in 2020.”

The Guardian

Data



Source

Data.la.org

Owner : LAPD

Time Period

February 2018 – October 2023

Dimension

Rows : 1.2 million rows

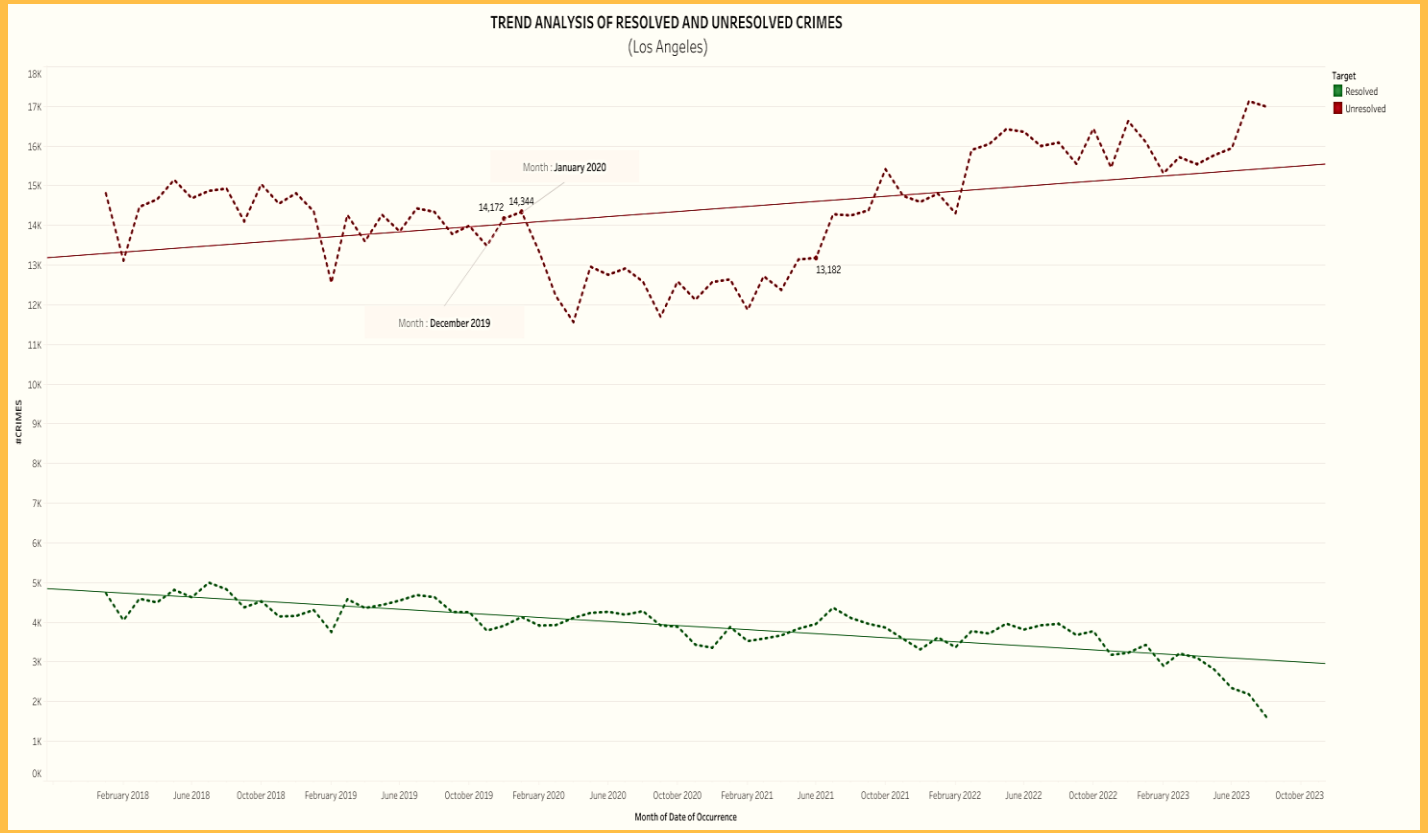
Columns : 22

Each row is a crime incident report

Features

Victim Information
Geographic Information
Premise Information
Type of crime
Weapons Used
Status

Analysis



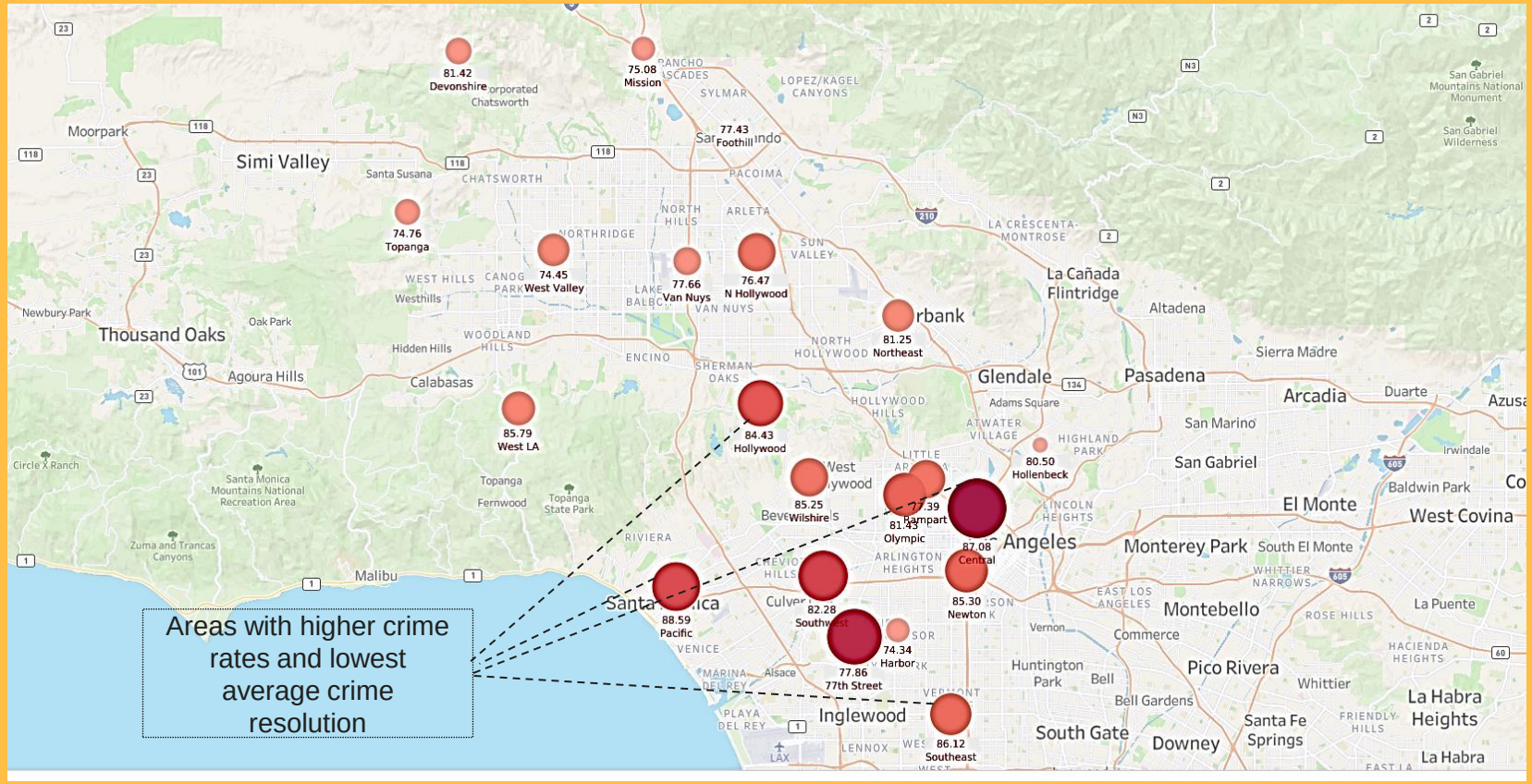
UNRESOLVED
RESOLVED

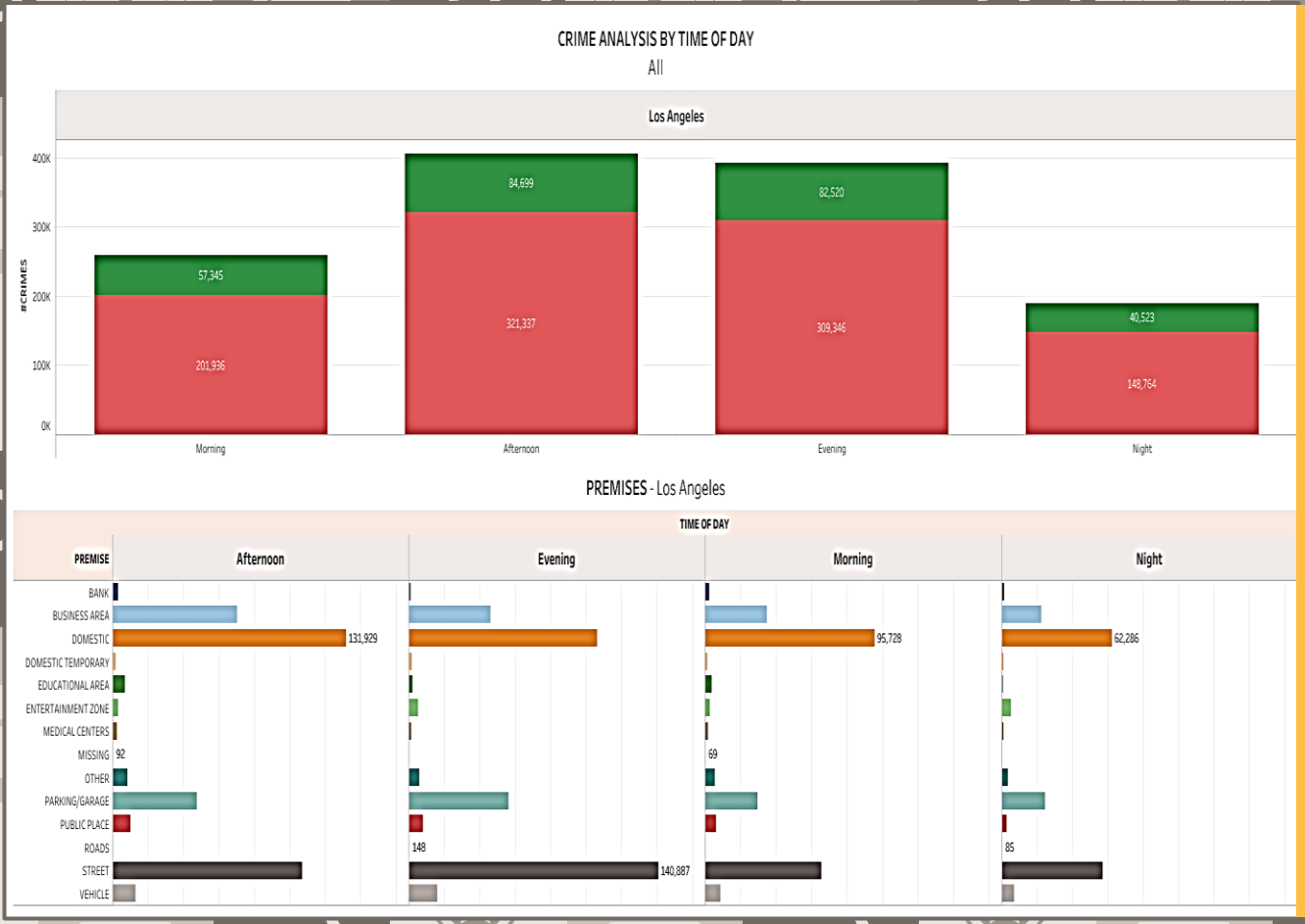
TIME PEROID
February 18 – October 23

PLOT
Month of Occurrence →
#Crimes ↓

OBSERVATIONS
- **Decreasing trend** of resolved crimes
- Ratio decreases from **1:3** in *June 2018* to **1:7** in *June 2023*

Where are you SAFE?





Does Time of Occurrence impact crime resolution?

Highest crime occurrence period
Afternoon (12 PM – 6 PM)

Highest proportion of crime resolved
Night (12AM – 6AM)

Most crimes have occurred in:
Domestic Areas
Street

ANALYSIS OF VICTIM DEMOGRAPHICS - WEAPON USE AND PREMISE

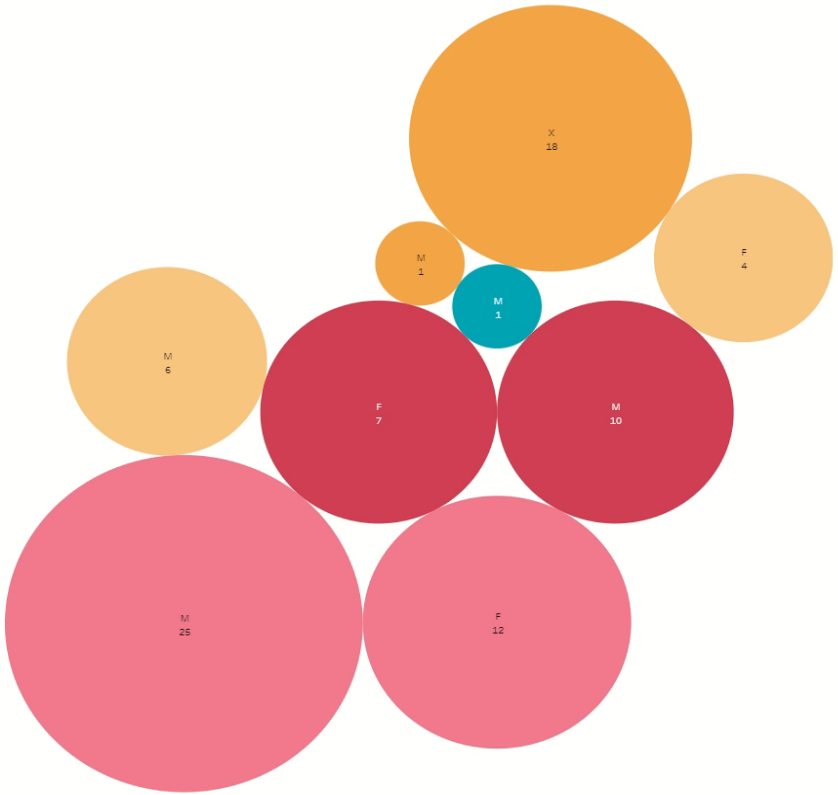
STATUS
(All)
Resolved
Unresolved

DESCENT
Black
Hispanic
Other Races
Unknown
White

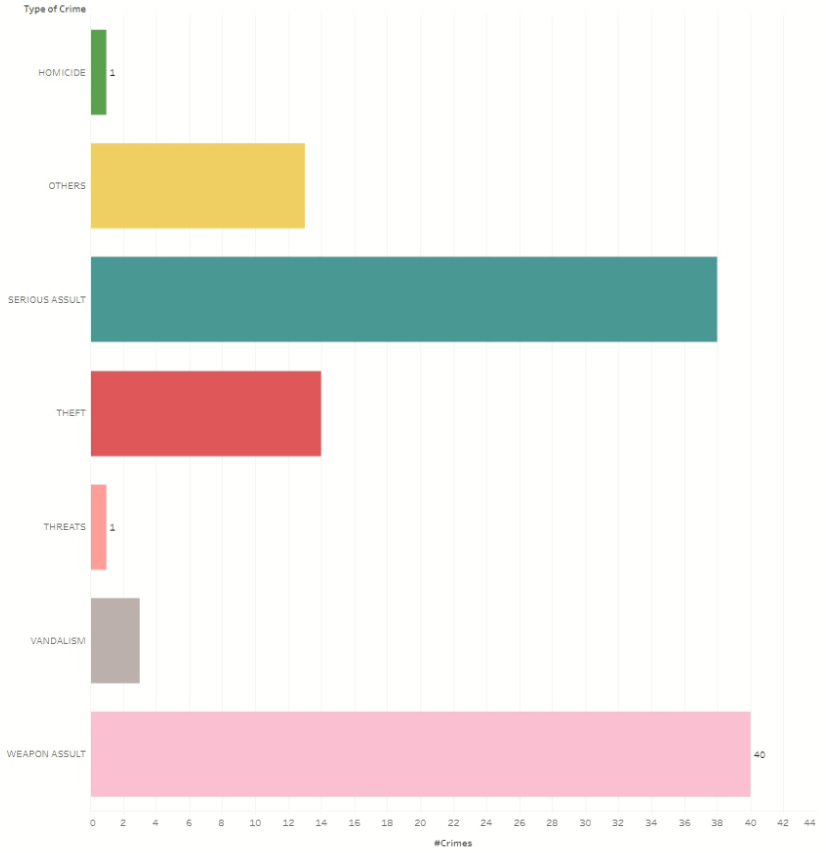
PREMISE
(All)
BANK
BUSINESS AREA
DOMESTIC
DOMESTIC TEMPORARY
EDUCATIONAL AREA
ENTERTAINMENT ZONE
MEDICAL CENTERS
MISSING
OTHER
PARKING/GARAGE
PUBLIC PLACE
ROADS
STREET
VEHICLE

WEAPON TYPE
FIREARM

CRIME RESOLUTION BY GENDER AND RACE
(Unresolved)



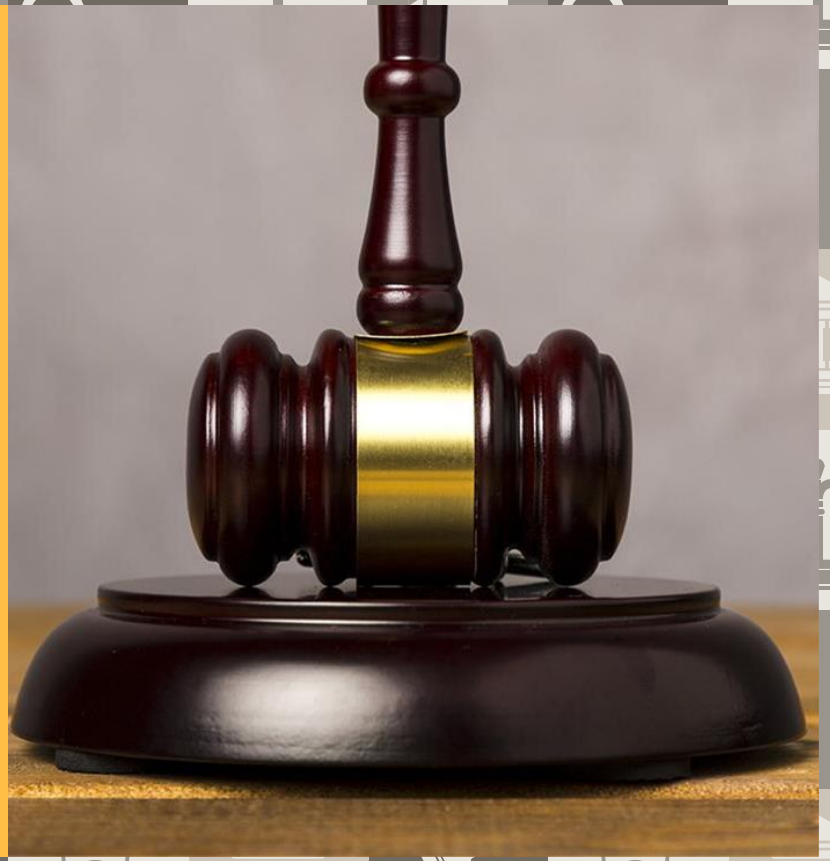
WEAPON USE IN CRIMES
(FIREARM)



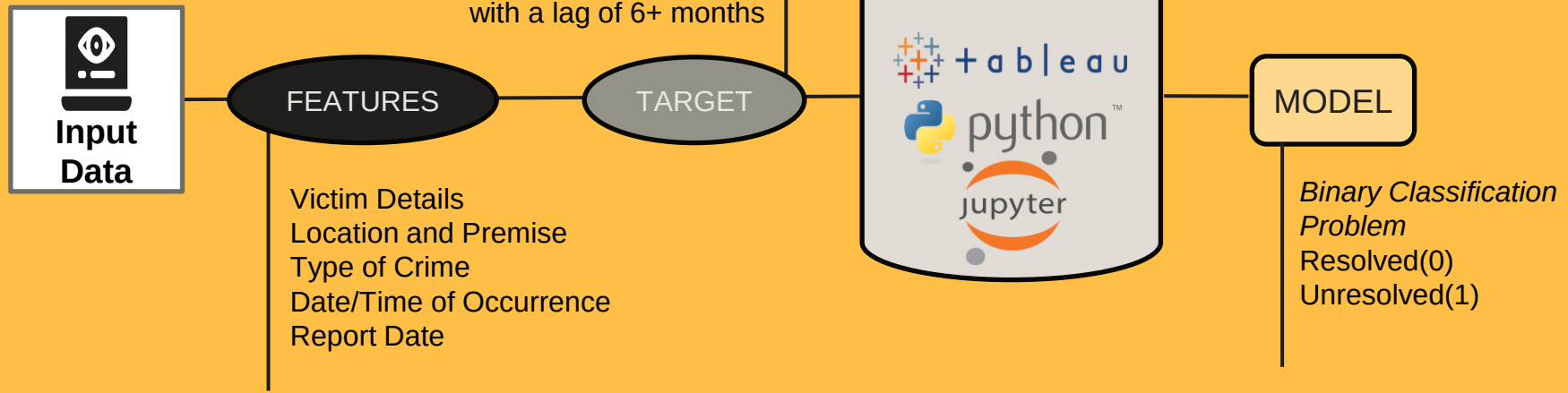
View on Tableau Public

Predictive Model

- **Probability of Resolution**
- Case by Case **Resolved vs Unresolved** Prediction



Methodology



Machine Learning Models – Classifiers

Machine learning is a **branch of artificial intelligence (AI)** and computer science which focuses on the *use of data and algorithms* to **imitate the way that humans learn, gradually improving its accuracy.**
- IBM

Decision Tree

Accuracy – 71.92%
Precison – 70.02%
F1 Score – 70.21%

Random Forest

Accuracy – 78.98%
Precison – 82.44%
F1 Score – 80.17%

Extreme Gradient Boosting

Accuracy – **87.71**%
Precison – **87.76**%
F1 Score – **87.21**%

Observations

Type of Crime comes out as a key feature in the model.
Identity Theft, *Grand theft*, *Homicide* and *Crimes against Children* have higher probability of resolution while *Financial Crimes, Assault* and *Vandalism* have the least probability of arrest.

Lag in Reporting is an important feature our the model. However, **Date** and **Time of Occurrence** of the crime do not have a significant impact on arrest probability.

Gender and **Race** do not turn out as significant parameters in our analysis

In **Areas** like *North Hollywood*, *Newton* and *Southeast* of Los Angeles, it is more likely that arrests will be made for a given crime.
For **Premise,** crimes that occur in *domestic areas* have higher arrest rates.

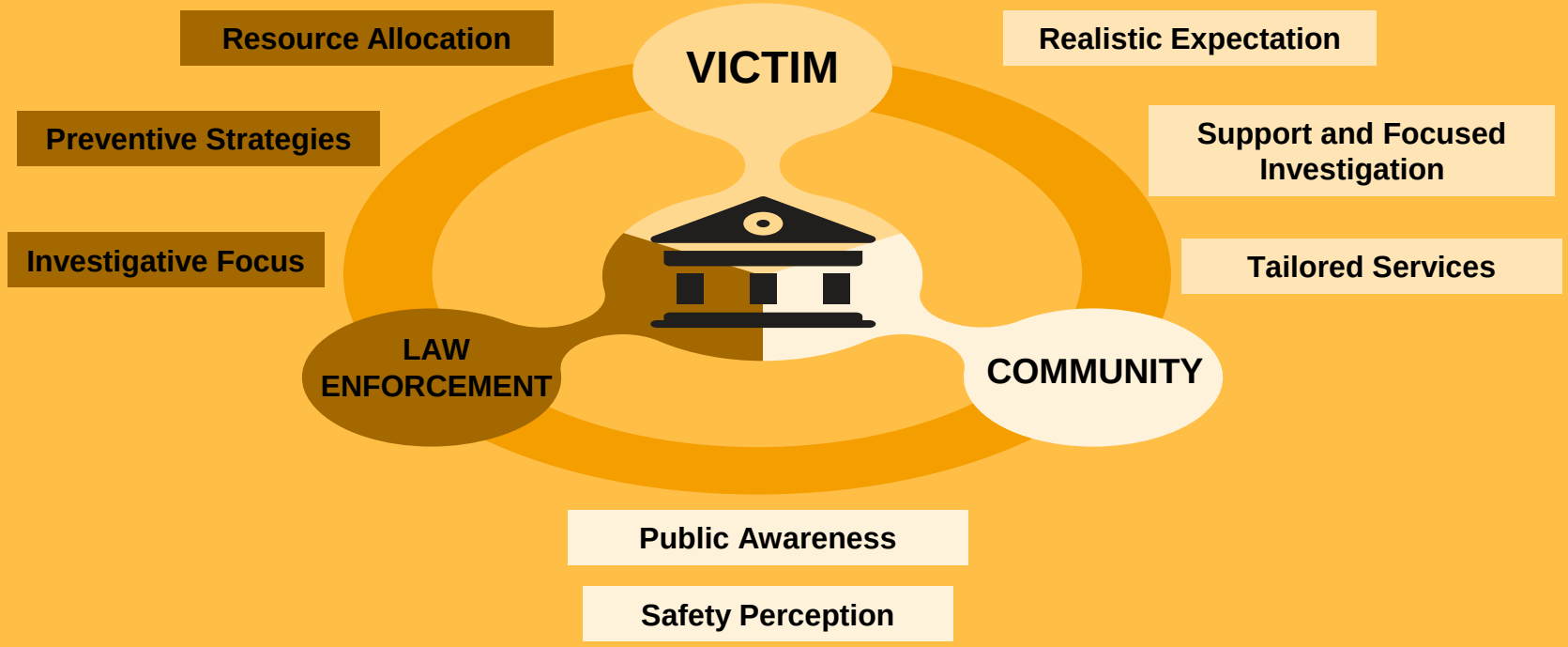
Model Demo

```
##########################################################################
######################### ENTER VICTIM DETAILS ###########################
##########################################################################

Age= int(input("Enter Victim Details: Age - "))
Gender= input("Enter Victim Details: Gender - ")
Race= input("Enter Victim Details: Race - ")
```

```
##########################################################################
################### ENTER DETAILS ON TIME OF OCCURANCE ###################
##########################################################################
```

Strategic Implications



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THANK YOU