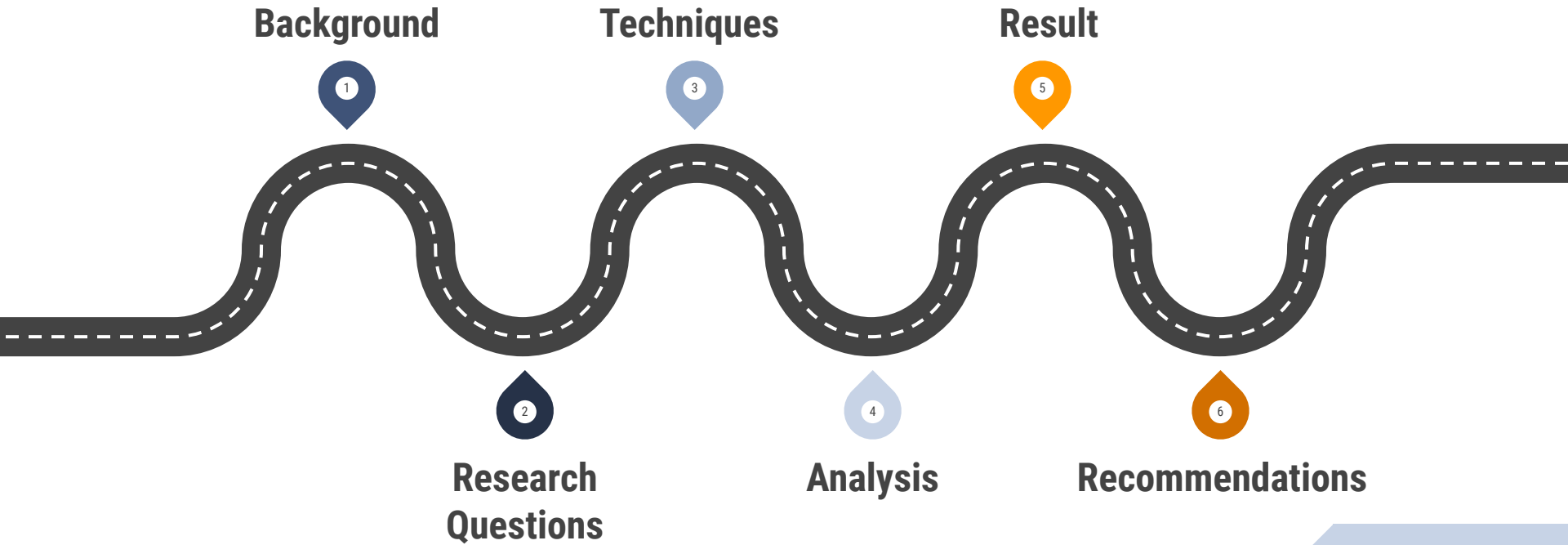


# Los Angeles Police Department Patrolling

Elven Liu, Stacy Lin, Tsai-Hsuan Cheng, Jahnavi Rati



# Agenda



1

**Background**



## Background

- Since the beginning of the pandemic, the Los Angeles Police Department COMPSTAT (Crime Statistics) continues to show increases in major crimes.
- Number of LAPD Officers shrink to lower numbers month after month.
- The current shortage and increase in crimes affects the department's ability to patrol neighborhoods and to respond to calls.
- Improve the efficiency of police Patrolling has become the priority to LAPD.



# 2

## Research Questions



## Research Question

# How can the LAPD improve their patrolling efficiency?

**When** and **where** do most of the criminal activities occur, and **what** type of criminal activity is mostly engaged?

In LA, **which** demographics are victimized the most?

# 3

## Analytic Techniques



## We have 3 techniques

### Cluster

Explore the demographic similarity of the victims in each cluster to categorize the victim and enhance the patrolling.

### Time Series

Find out when the most criminal activities happen and use ARIMA to predict trend of criminal activities that may happen over the next 24 months.

### Spatial

Visualize the spread of different types of criminal activities occurring throughout LA to identify and suggest an increase in patrolling.

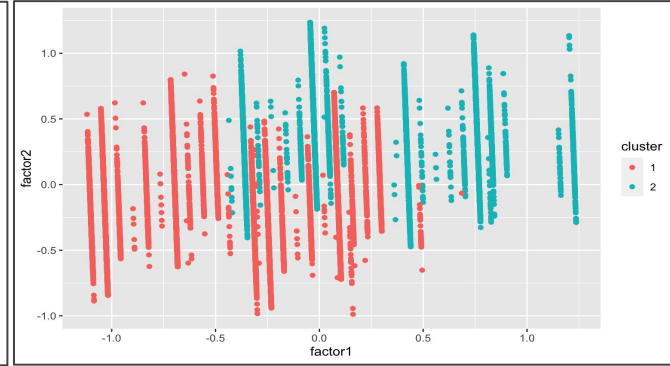
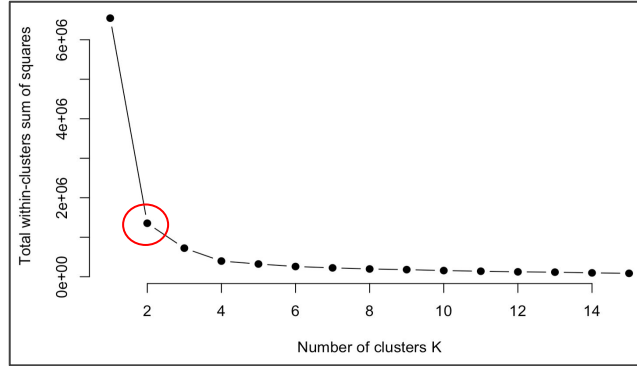


# 4

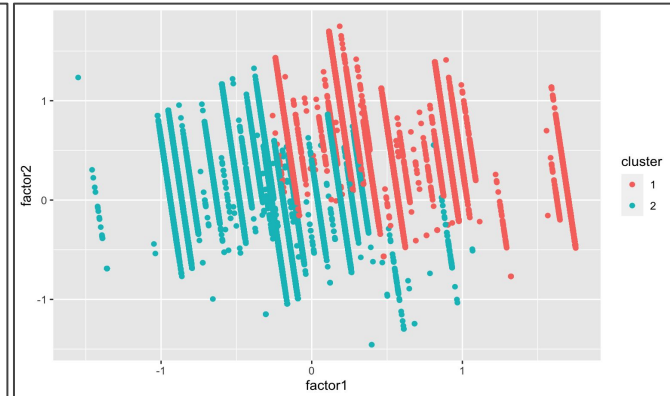
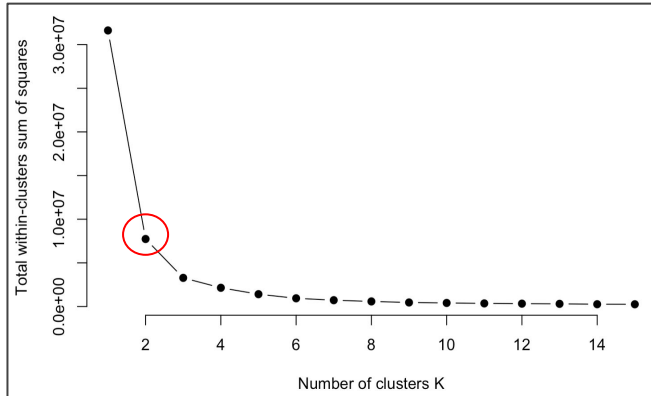
## Cluster Analysis

# K-Means Clustering

2020



2019-2020



## Result from K-means Clustering

**2020**

	Vict.Age(Mean)	Female(Count)	Male(Count)	Vict.Descent(Mode)
1	38.13	50,234	48,369	H - Hispanic/Latin/Mexican(61,780), B - Black(29,290)
2	41.39	24,060	37,489	W - White(43,050)

**2019 - 2020**

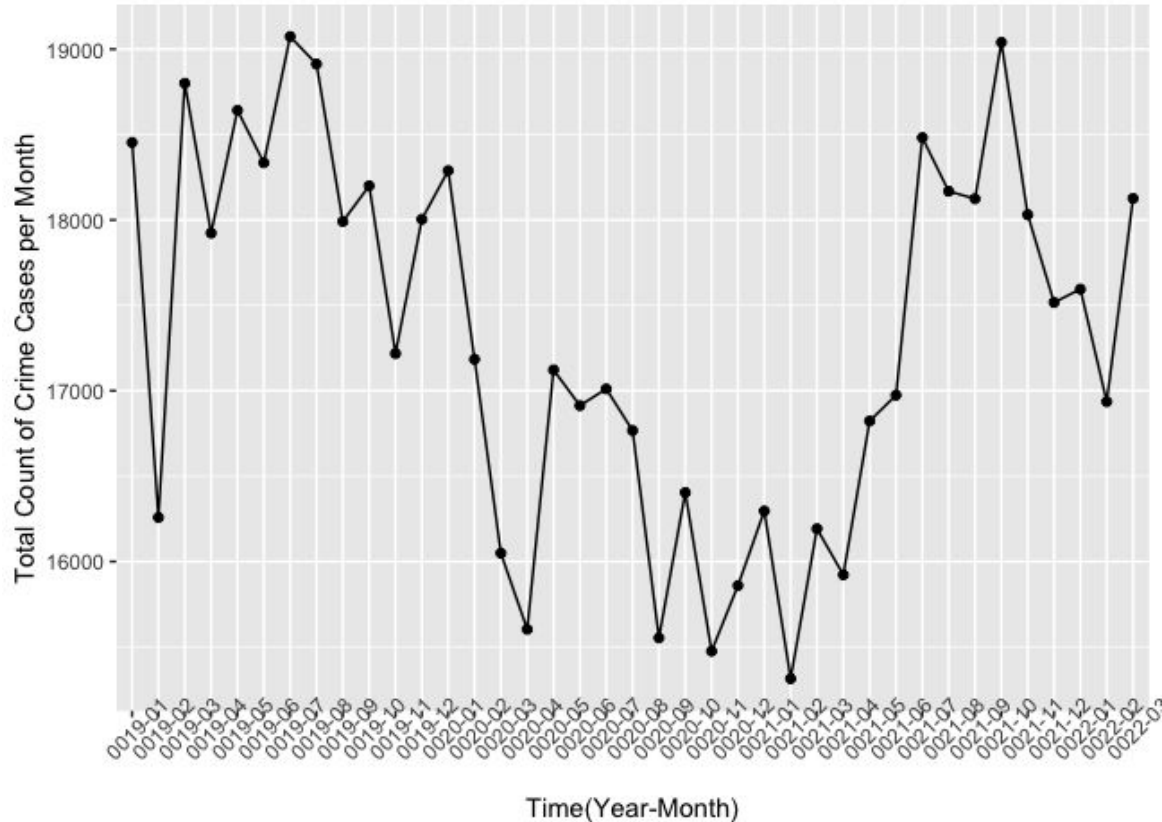
	Vict.Age(Mean)	Female(Count)	Male(Count)	Vict.Descent(Mode)
1	31.42	82,891	129,050	W - White(145,979)
2	29.98	172,647	162,585	H - Hispanic/Latin/Mexican(213,777), B - Black(99,285)

# 5

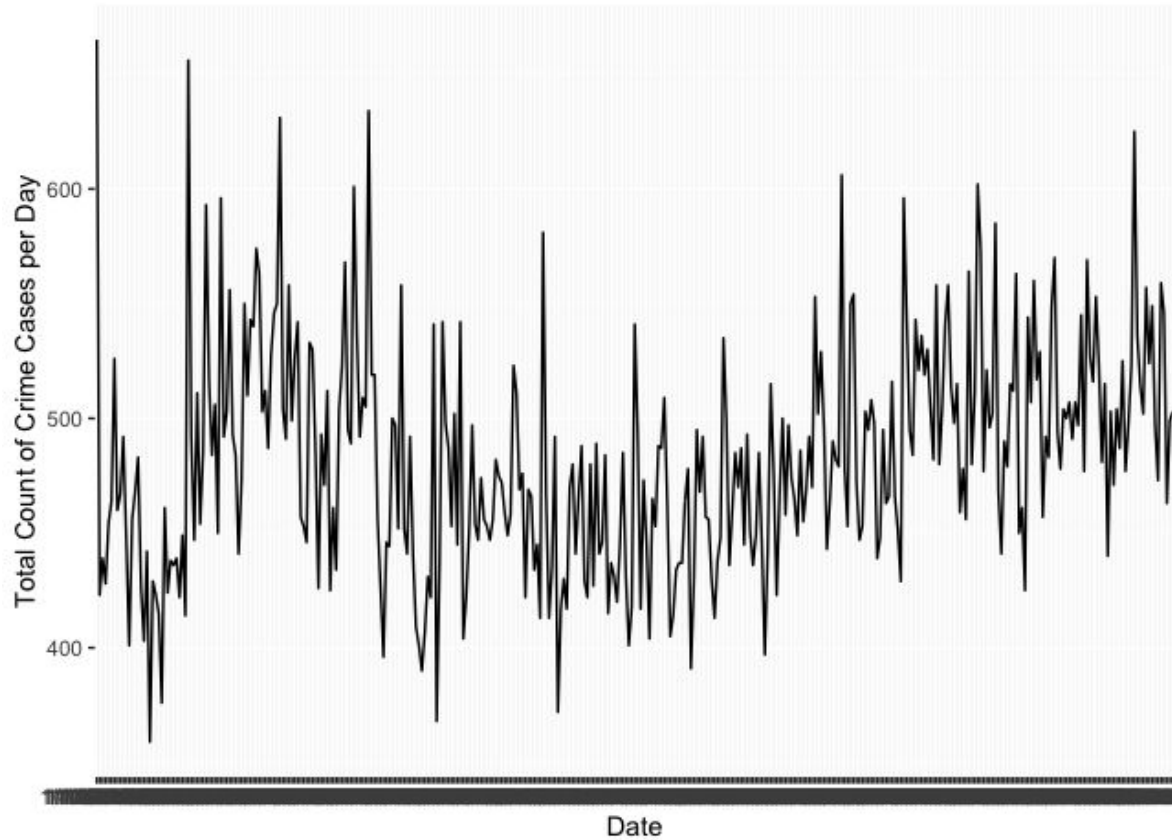
## Time Series Analysis

# Monthly Count of Crime Cases

Monthly Count of Crime Cases from 2019-01 to 2021-03

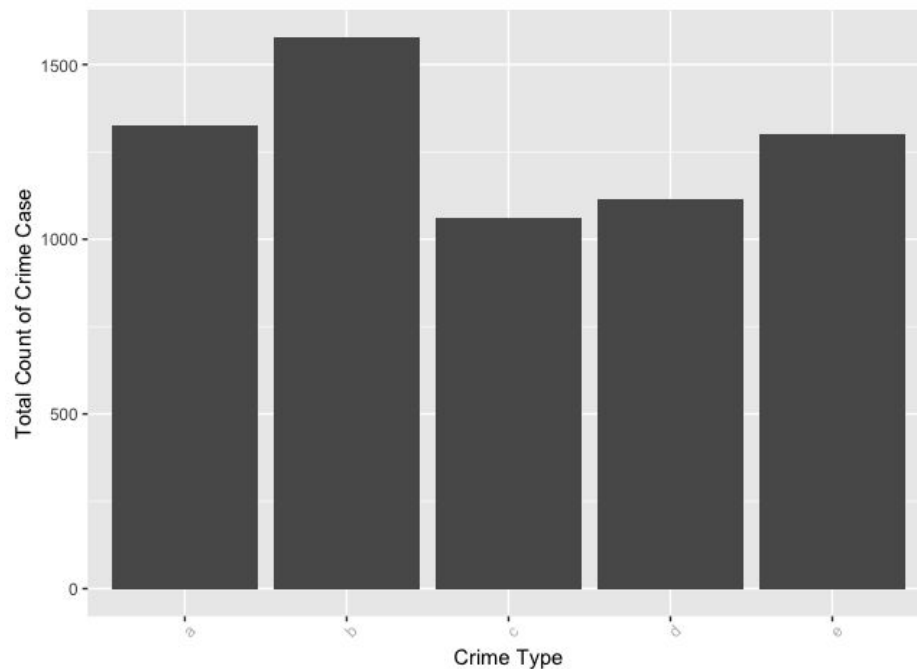


## Daily Count of Crime Cases in 2021



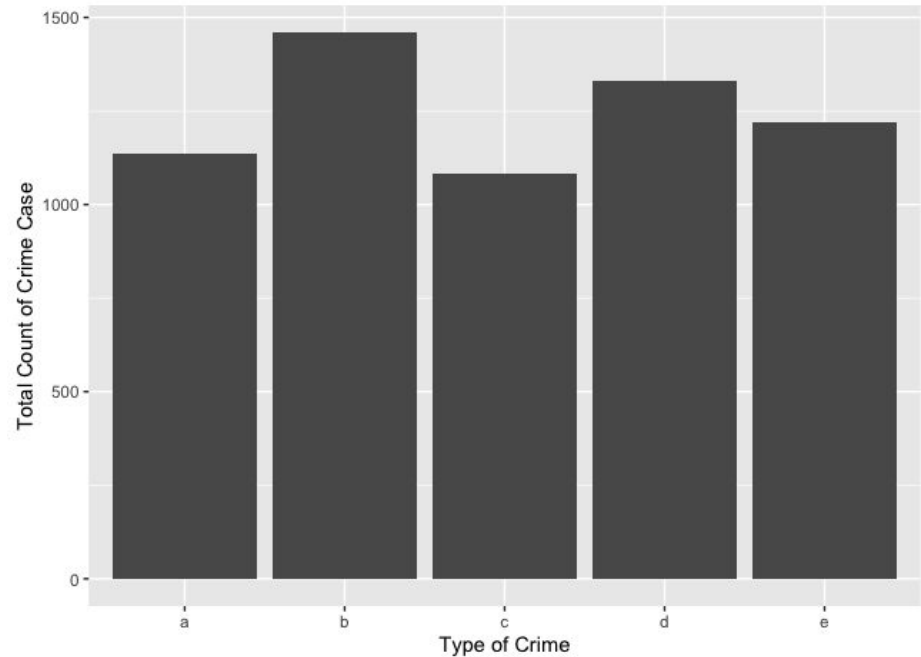
## Top 5 Kinds of Crime Cases in July 2021

	Crime	Count
a	ASSAULT WITH DEADLY WEAPON, AGGRAVATED ASSAULT	1325
b	BATTERY - SIMPLE ASSAULT	1578
c	BURGLARY	1063
d	BURGLARY FROM VEHICLE	1113
e	VANDALISM - FELONY (\$400 & OVER, ALL CHURCH VANDALISMS)	1300



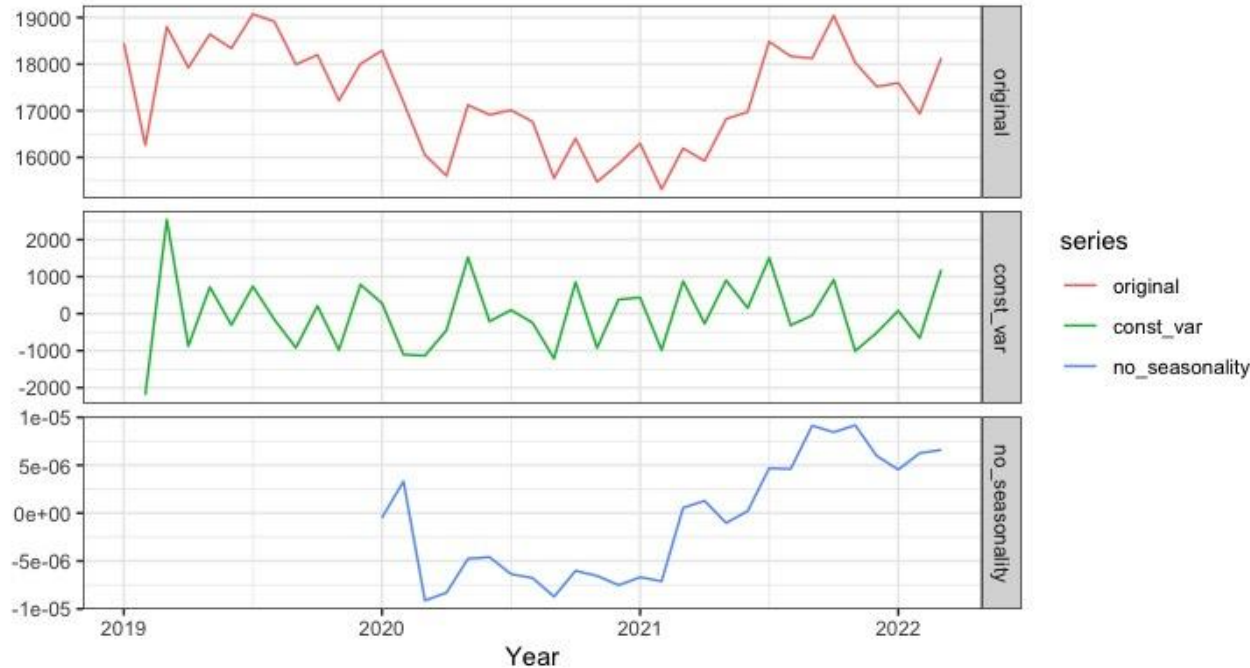
## Top 5 Kinds of Crime Cases in October 2021

	Crime	Count
a	ASSAULT WITH DEADLY WEAPON, AGGRAVATED ASSAULT	1136
b	BATTERY - SIMPLE ASSAULT	1460
c	BURGLARY	1082
d	BURGLARY FROM VEHICLE	1329
e	VANDALISM - FELONY (\$400 & OVER, ALL CHURCH VANDALISMS)	1219





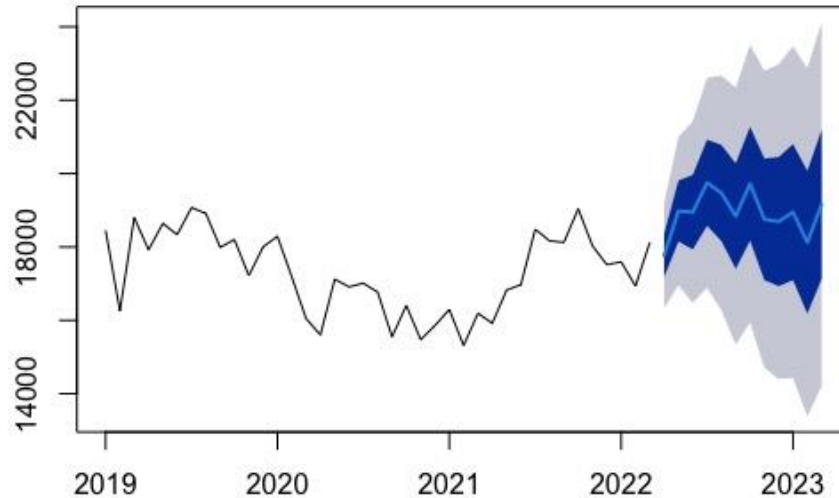
# ARIMA Model - Stationary



- The original dataset is not stationary.
- Use box-cox transformation and remove seasonality and trend using differencing to stabilize the variance.

# ARIMA Model - Forecast

Forecasts from ARIMA(0,1,0)(1,1,0)[12]

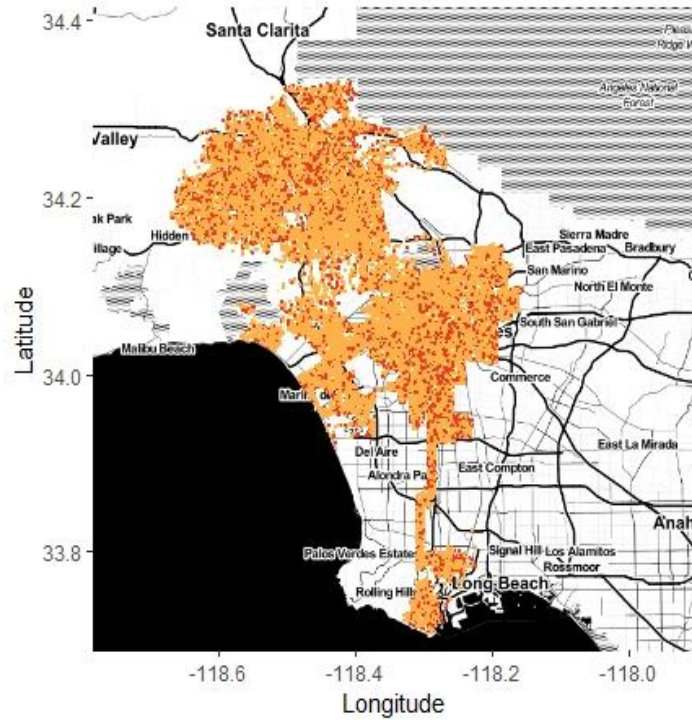


- Use AICc to search for the best model to forecast.
- **Blue line:** forecast
- **Dark area:** 80% prediction intervals
- **Light area:** 95% prediction intervals

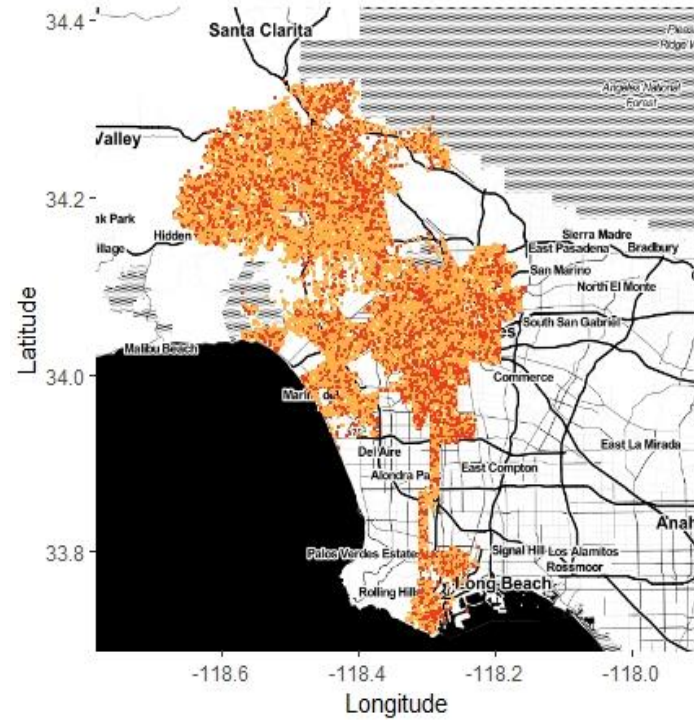
# 6

## Spatial Analysis

**YEAR 2020**



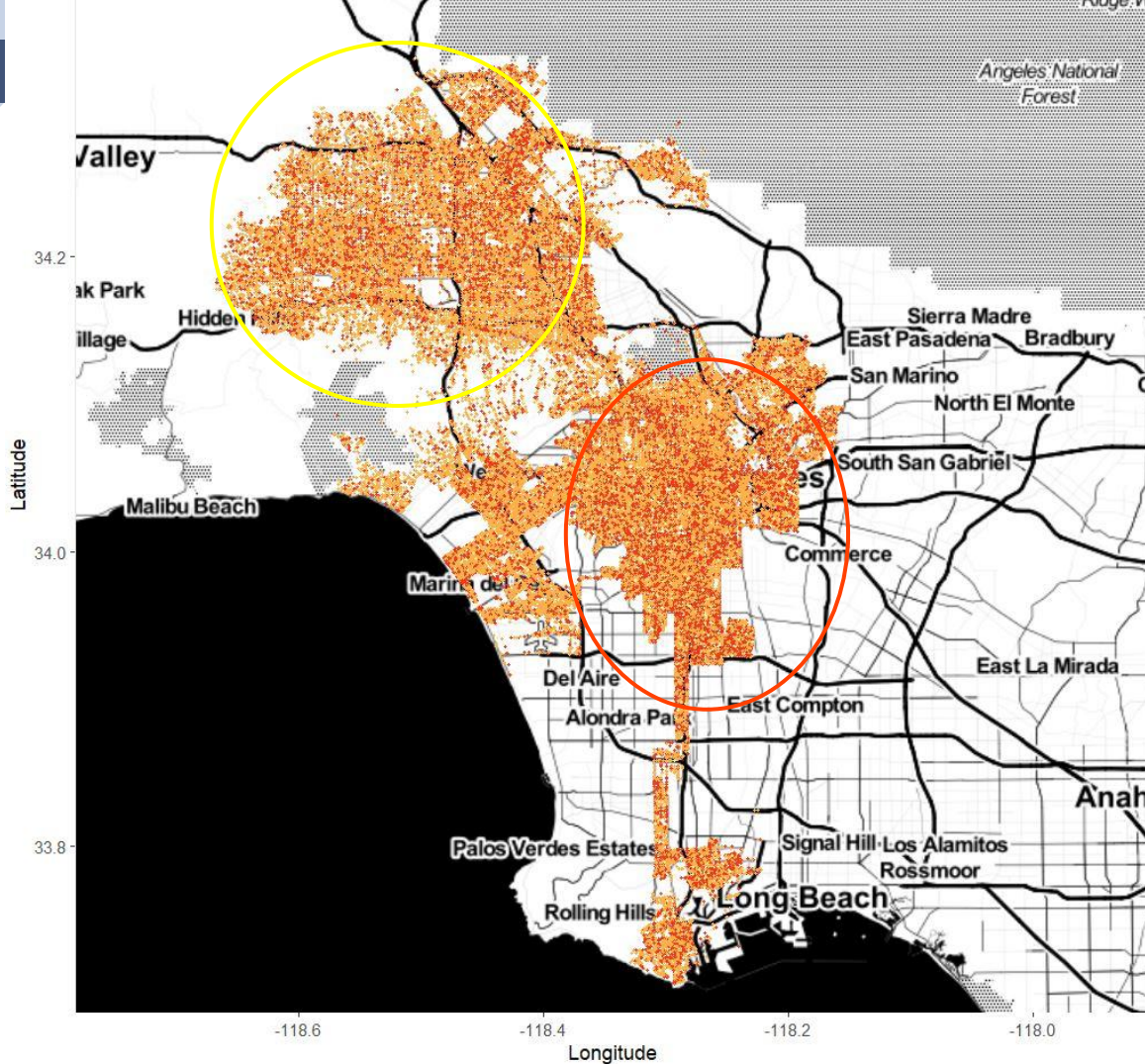
**YEAR 2021**



- Violent Crime
- Financial Crime
- Others

## 21 Communities:

77th Street  
 Central  
 Devonshire  
 Foothill  
 Harbor  
 Hollenbeck  
 Hollywood  
 Mission  
 N Hollywood  
 Newton  
 Northeast  
 Olympic  
 Pacific  
 Rampart  
 Southeast  
 Southwest  
 Topanga  
 Van Nuys  
 West LA  
 West Valley  
 Wilshire

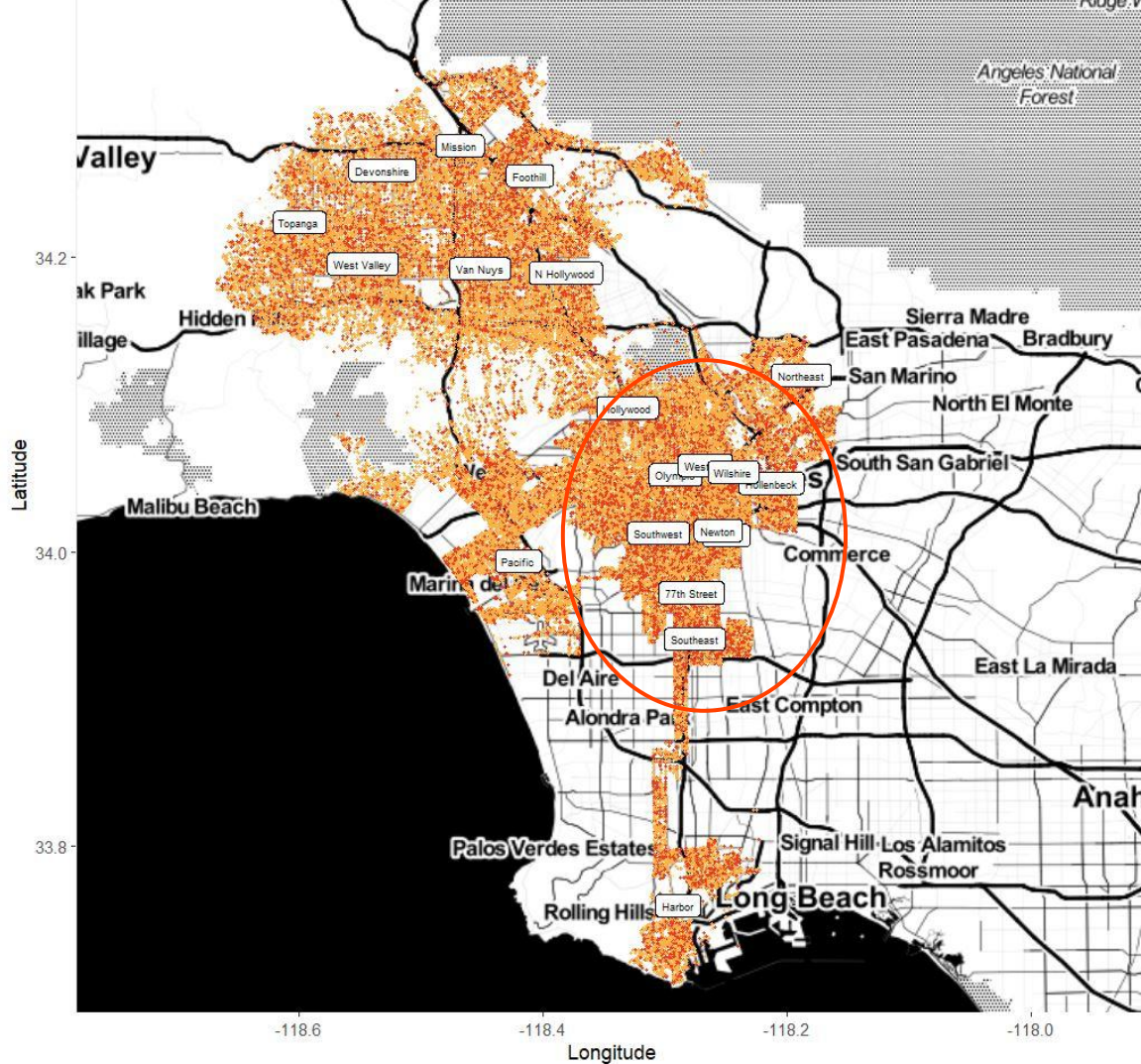


## YEAR 2020 - PRESENT

- Violent Crime
- Financial Crime
- Others



21 Communities:  
 77th Street  
 Central  
 Devonshire  
 Foothill  
 Harbor  
 Hollenbeck  
 Hollywood  
 Mission  
 N Hollywood  
 Newton  
 Northeast  
 Olympic  
 Pacific  
 Rampart  
 Southeast  
 Southwest  
 Topanga  
 Van Nuys  
 West LA  
 West Valley  
 Wilshire



## YEAR 2020 - PRESENT VIOLENT CRIMES

- Violent Crime
- Financial Crime
- Others

*Average Violent  
 Crime Rate  
 Throughout:  
 38.77%*

# YEAR 2020 - PRESENT VIOLENT CRIMES

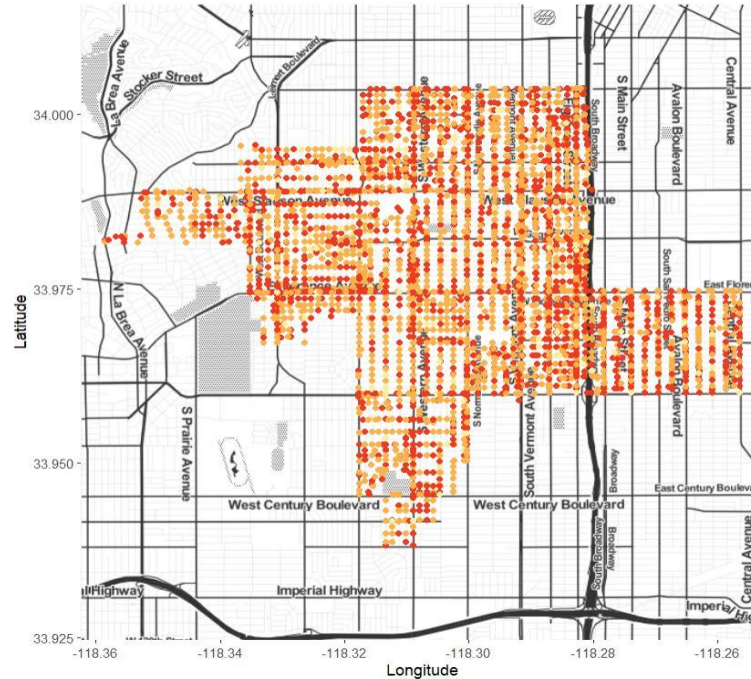
- Violent Crime
- Financial Crime
- Others

## SOUTHEAST



50.31% Violent Crime

## 77th Street

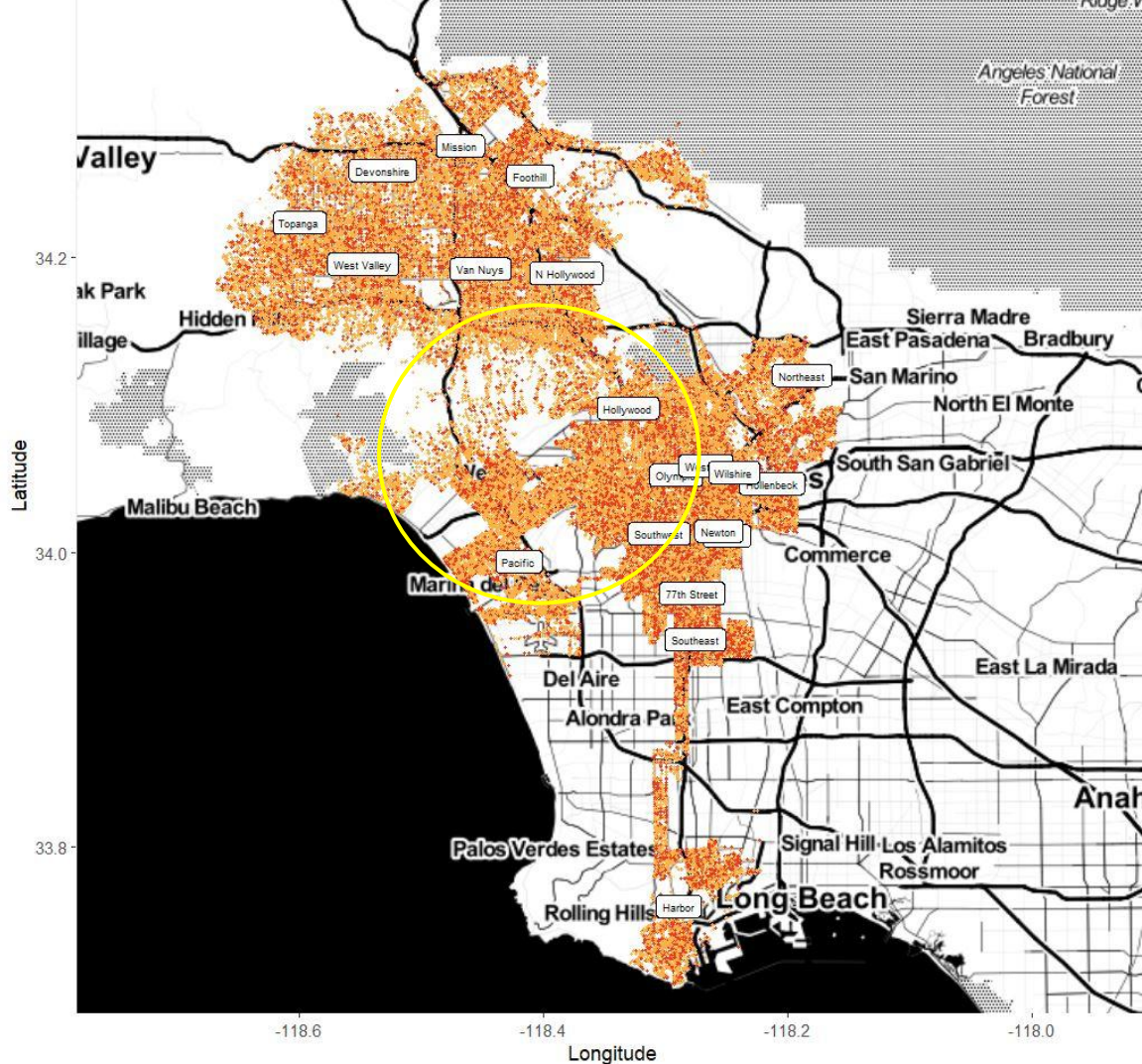


49.82% Violent Crime



## 21 Communities:

77th Street  
 Central  
 Devonshire  
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 Hollenbeck  
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 N Hollywood  
 Newton  
 Northeast  
 Olympic  
 Pacific  
 Rampart  
 Southeast  
 Southwest  
 Topanga  
 Van Nuys  
 West LA  
 West Valley  
 Wilshire



## YEAR 2020 - PRESENT FINANCIAL CRIMES

- Violent Crime
- Financial Crime
- Others

Average Financial  
 Crime Rate  
 Throughout:  
 55.58%



## YEAR 2020 - PRESENT FINANCIAL CRIMES

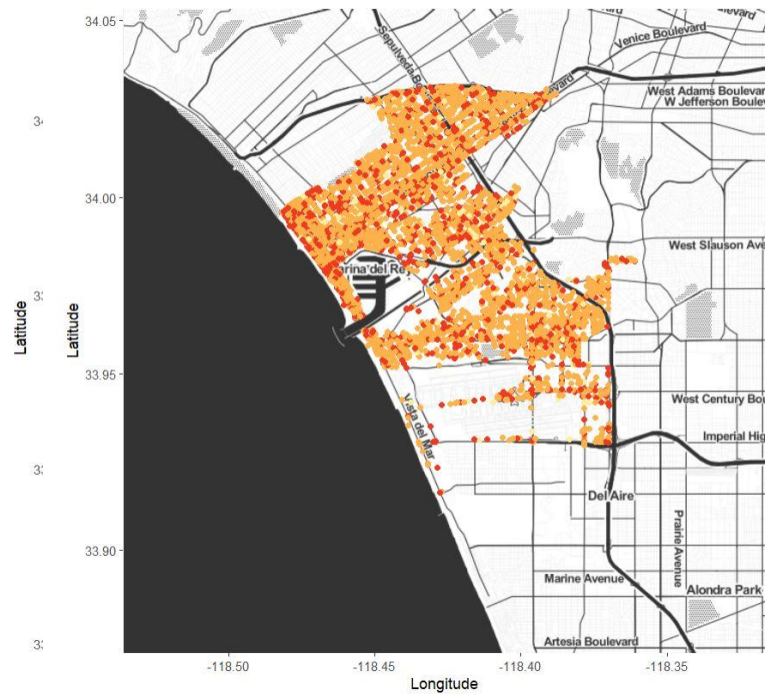
- Violent Crime
- Financial Crime
- Others

### WEST LA



66.92% Financial Crime

### Pacific



65.93% Financial Crime

## Result from Spatial Analysis

### Violent Crime

*Average Simple Assault Rate Throughout: 14.5%*

	Community	Type of Violence	Activity Rate	2020 to Present Journey
1	Southeast	Simple Assault	16.89%	Highest rate each year in the Southeast
2	77th Street	Simple Assault	16.36%	Highest rate each year in 77th Street

### Financial Crime

*Average Theft/Auto Repair Rate Throughout: 26.87%*

	Community	Type of Fin. Crime	Activity Rate	2020 to Present Journey
1	West LA	Theft/Auto Repair	29.08%	Highest criminal activity rate each year in West LA
2	Pacific	Theft/Auto Repair	32.74%	Highest criminal activity rate each year in West LA

# 7

## Recommendation



# Recommendations

## Cluster Analysis

- Enhance awareness on Black and Hispanic Female aged around 38 and White Male aged around 41
- More attributes about victims and criminals should be recorded for future analysis.

## Time Series Analysis

- LAPD should be more careful about assault in July and October.
- LAPD should focus on top types of crime - Assault, Battery, Burglary, Vandalism and consider different solutions accordingly.

## Spatial Analysis

- LAPD should be on high alert for any violent criminal activities including simple assault occurring in LA's southern communities.
- LAPD should patrol proactively for any theft/auto repair not just in West LA and Pacific, but the greater LA.



# Thanks!

Any questions?