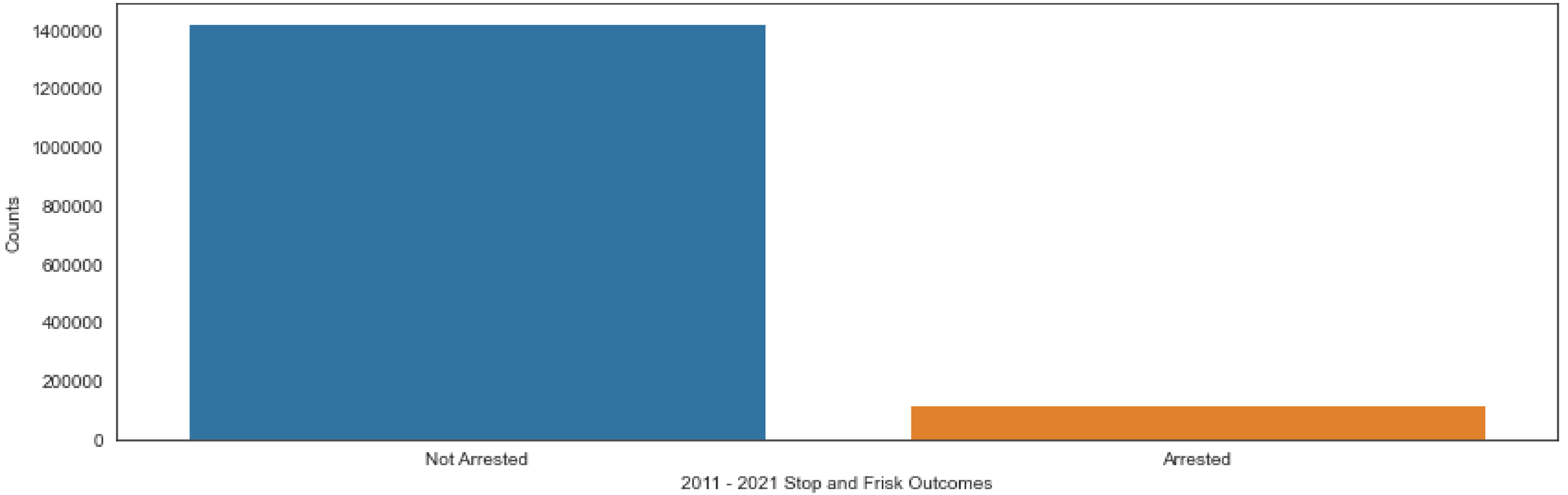
CAN MACHINE LEARNING DECREASE NEEDLESS STOP-AND-FRISKS ?

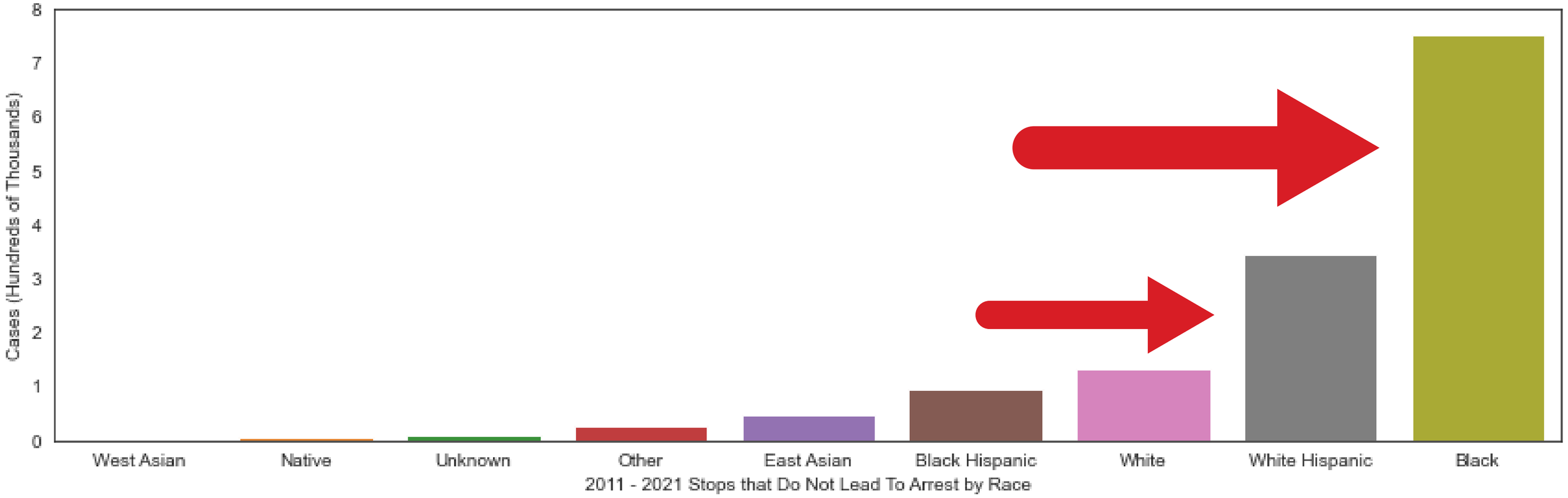
Louis Casanave, Flatiron School



92% of Stops in Last 10 Years Did Not Lead to Arrest

(one million four hundred twenty-five thousand eight hundred fifty-three stops)

Stop-and-Frisks more common among Black and Hispanic people



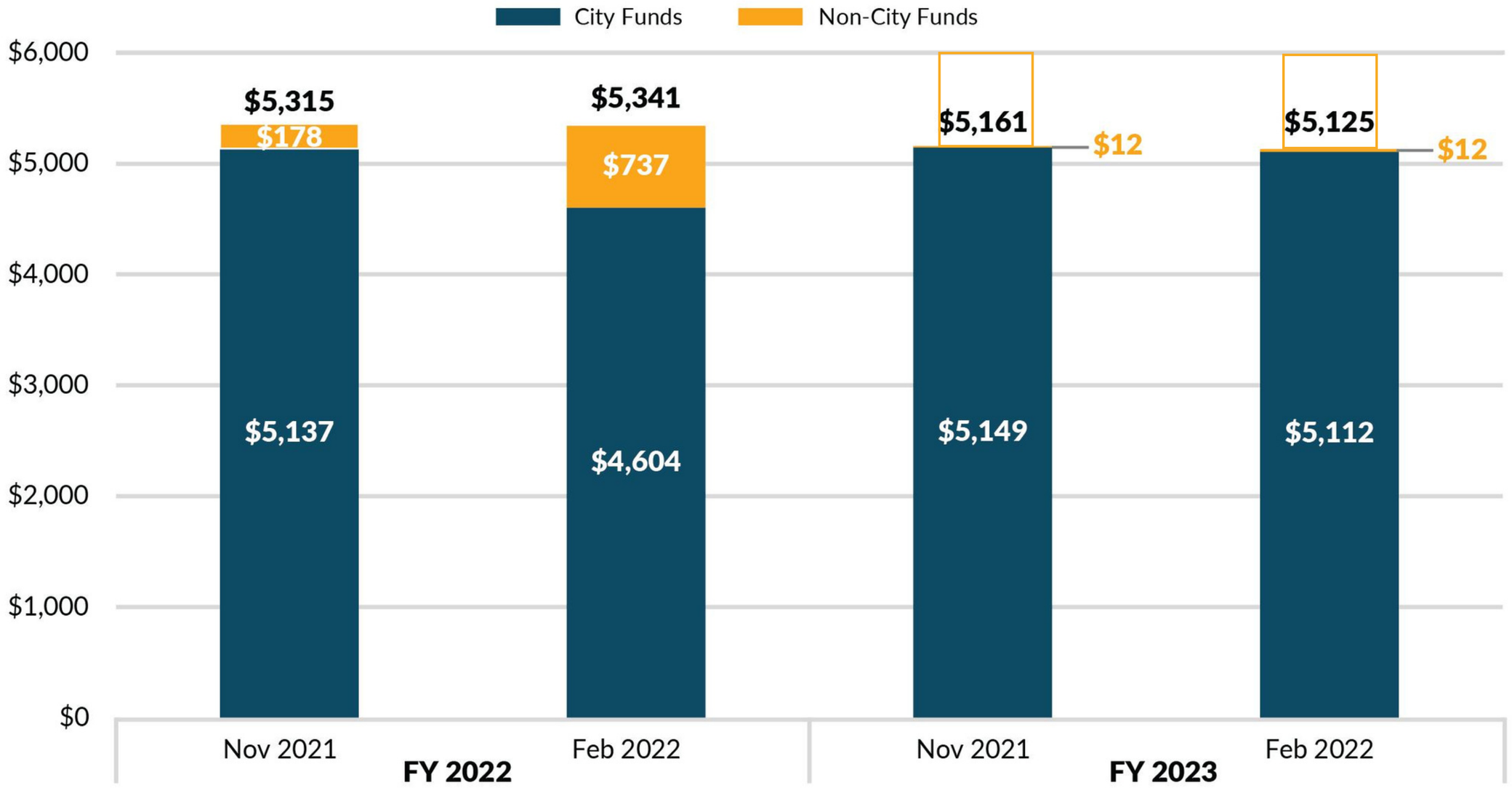
Stop-and-Frisks are publicly unpopular

(AP Photo/Seth Wenig, File)

- **NYPD has 83 million less in the budget next year**
- **the city is paying for more of it**

Figure 1: New York Police Department Agency Operating Budget for FY 2022 and FY 2023, November 2021 and February 2022 Financial Plans

(dollars in millions)



Source: City of New York, Mayor's Office of Management and Budget, *Preliminary Fiscal Year 2023 Budget: Financial Plan Expense* (February 16, 2022), and *November 2021 Financial Plan Expense* (November 30, 2021).

PROJECT GOALS:
LESS STOPS

Save NYPD Time

Better Police Relations with (BIPOC) New Yorkers

Save Taxpayers Money

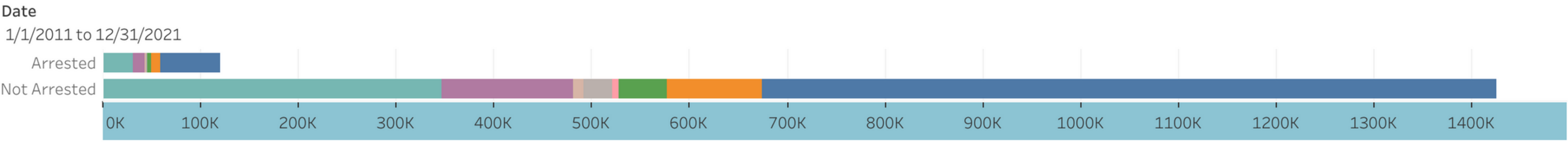
DELIVERABLES

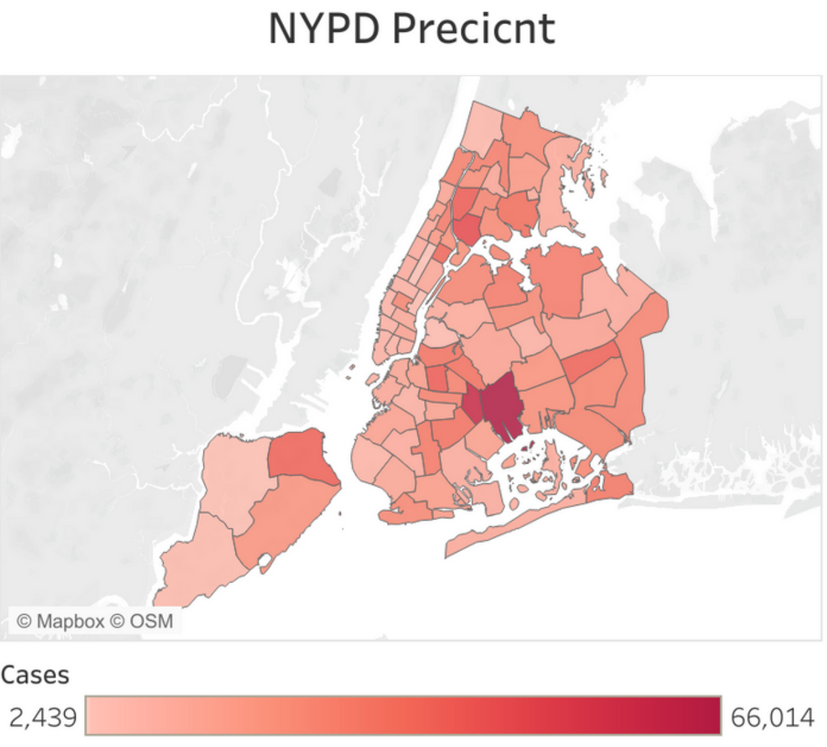
Transparency: Make Data Available for Average New Yorker

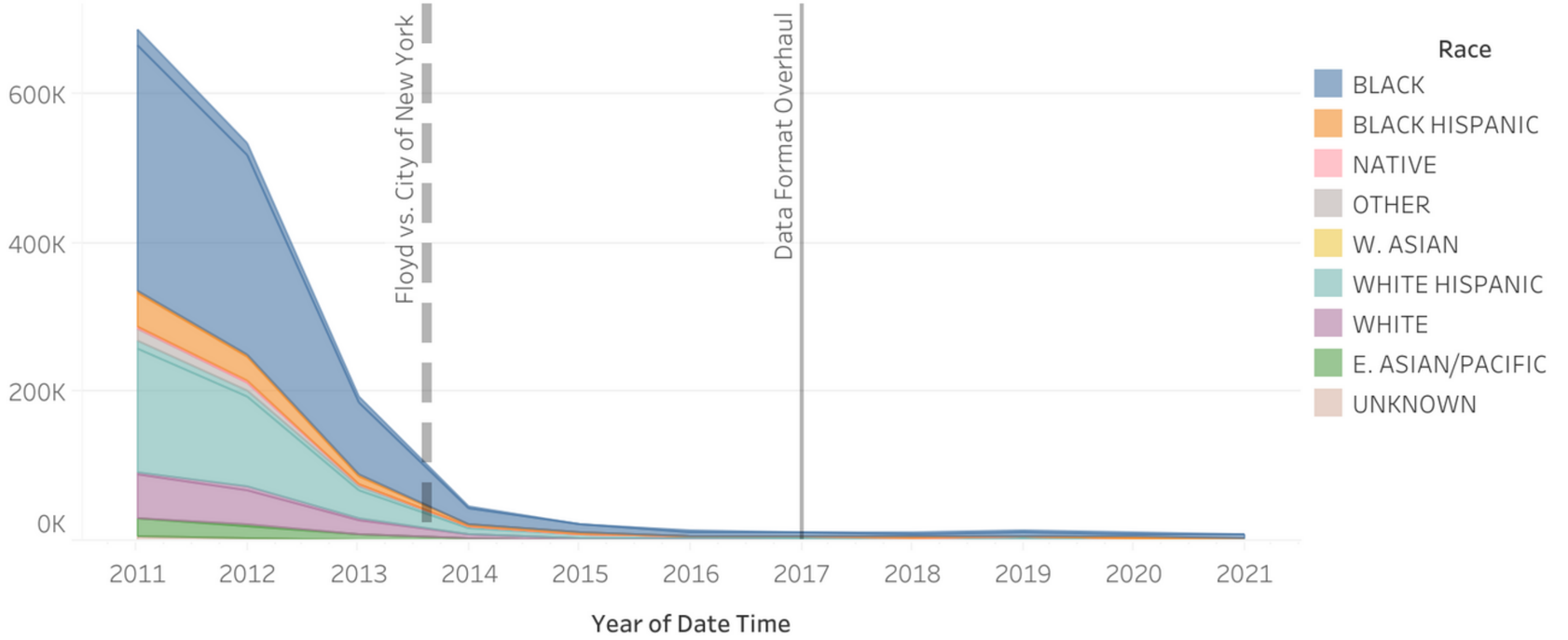
DONE

Modeling: Time Series Analysis

ONGOING







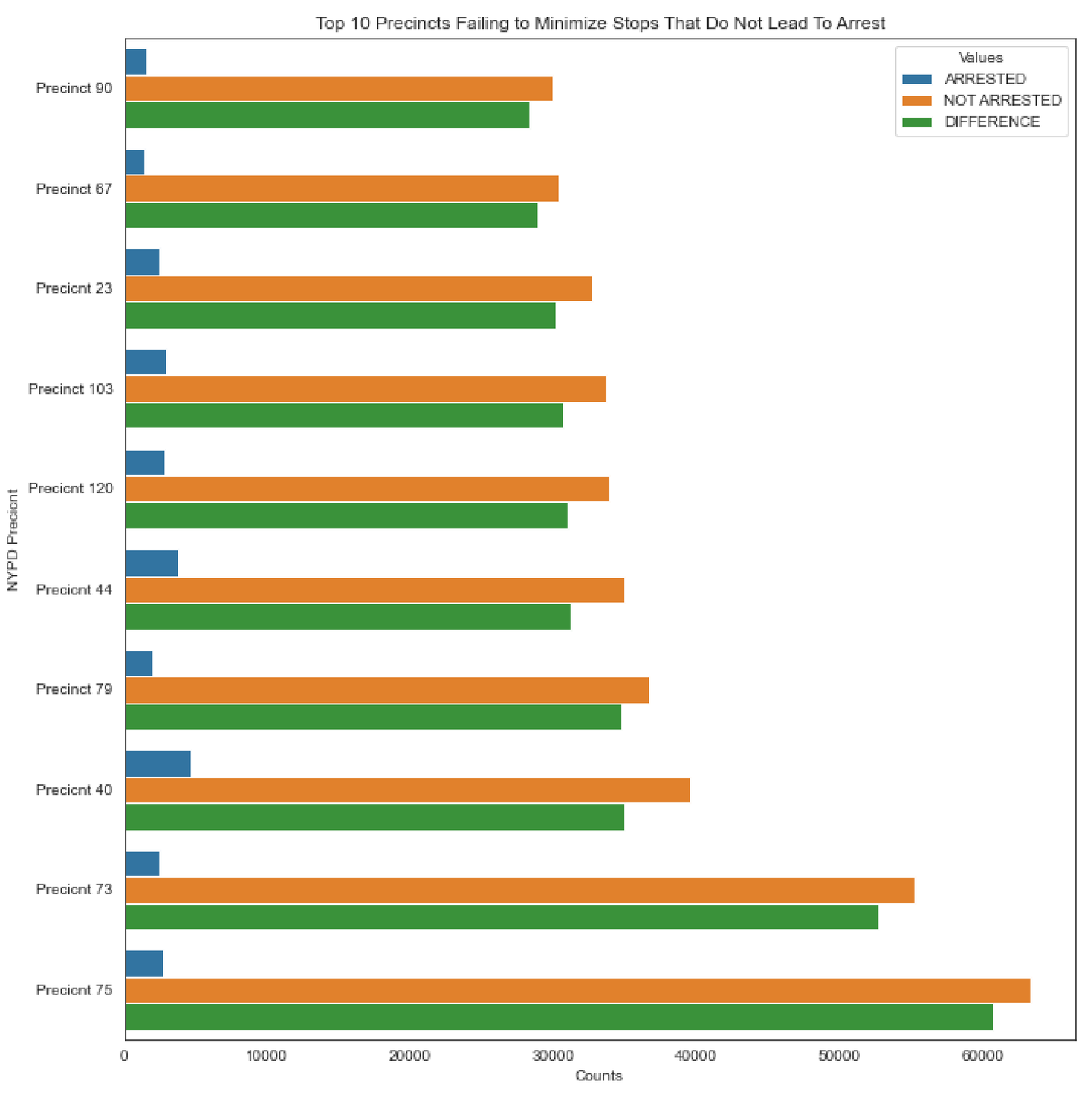
Data Analysis

1,545,827 STOPS

10 YEARS SINCE 2011

PRECINCT, RACE, OUTCOME

What Can Analysis Tell Us?



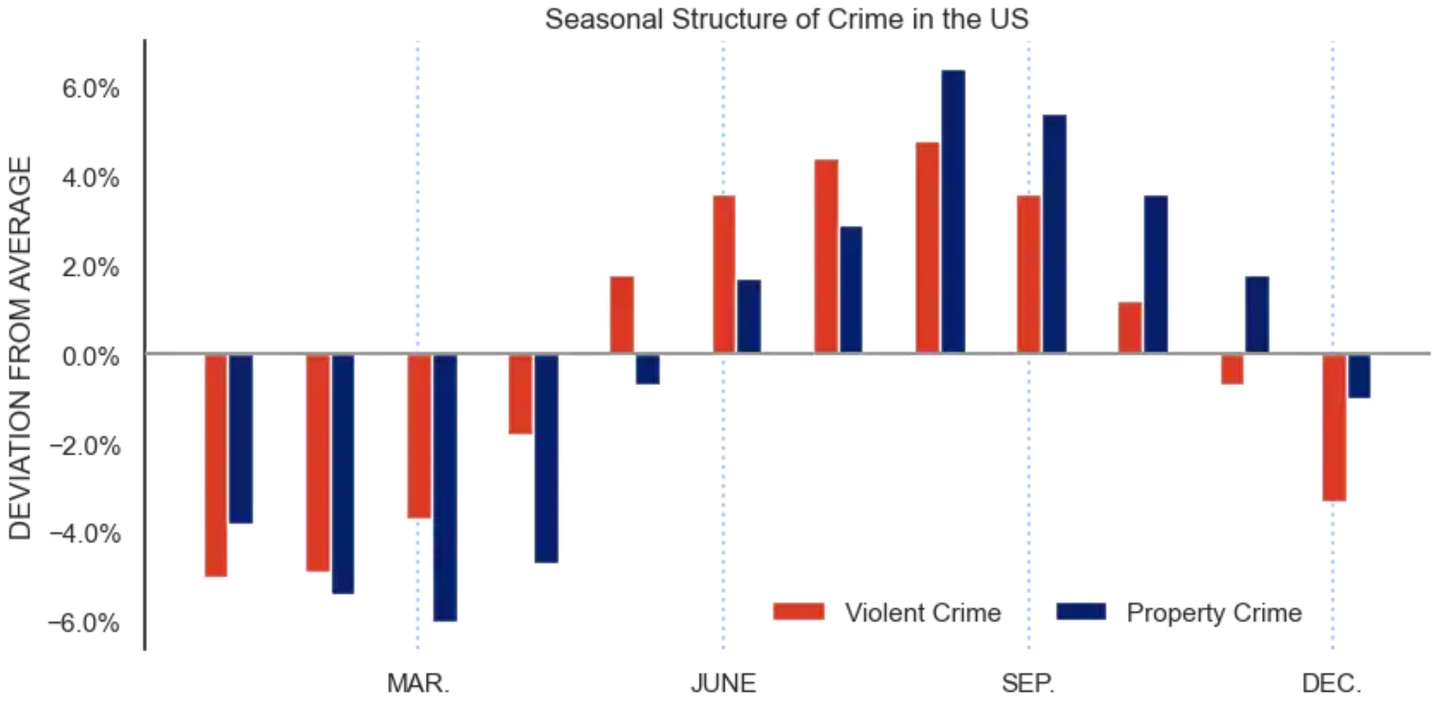
Data: Modeling

135,341 STOPS

7 YEARS

OUTCOME ONLY

SINCE FLOYD VS CITY OF NEW YORK



(Pinkertons)

WHY TRY TIME SERIES MODELING?

- Crime is Seasonal
- Time data is demagraphic neutral

MODELING GOALS

- Predict reoccurring times when stops do not lead to arrest
- Less stops during those times

MODELING METHODS

Naive Model	Last Month
Random Walk Model	Using Last Month
ARI Model	Using Last Month and Auto Regression
IMA Model	Using Last Month and Moving Average
SARIMA Model	Using Last month, Auto Regression, Moving Average and Season

MODELING RESULTS

Naive Model	2% off
Random Walk Model	10% off
ARI Model	10% off
IMA Model	10% off*
SARIMA Model	10% off

What Can A NAIVE Model Tell Us?

1) Last Month is the best predictor for today

2) Need LESS stops during spikes

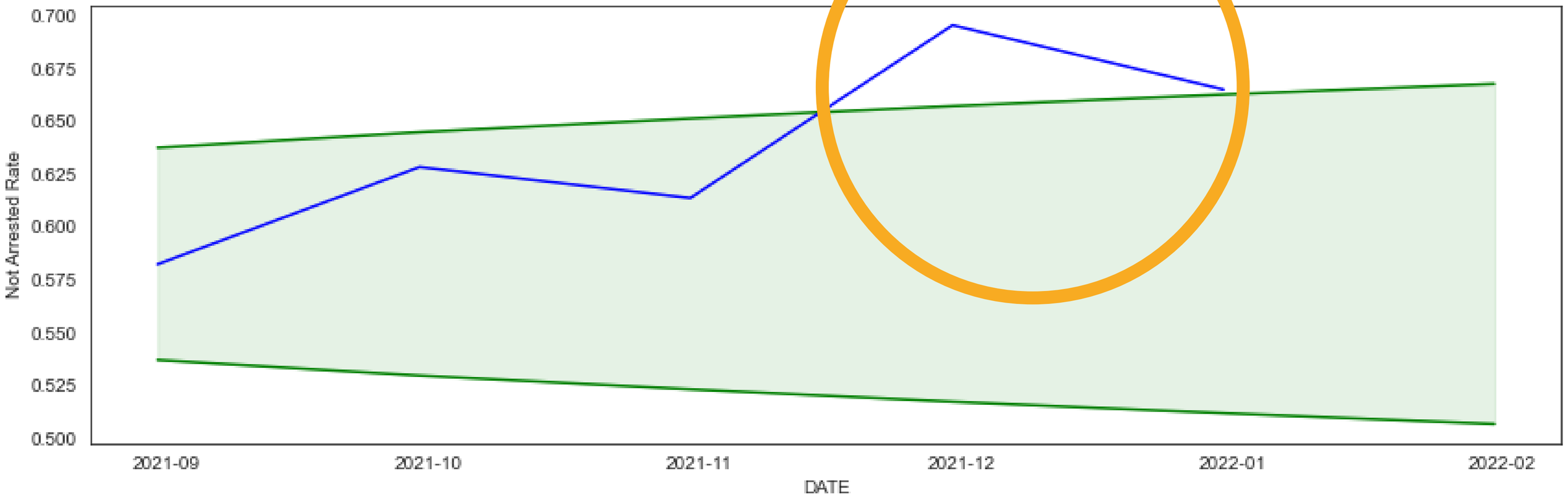
What Can An IMA Model Tell Us?

Use for anomaly detection:

Alert when rates are higher than historic precedence

IMA MODEL IN ACTION

Successfully Identified 2021 December Spike as an Outlier



Recommendations:

- More training for top 10 Precincts
- Use IMA Model to Detect Ouliers
- Increase NYPD Responsiveness to change

Future Work

- Model More Variables
- Different Model Types
- More Accurate Predictions

THANK YOU FOR YOUR TIME

QUESTIONS

github.com/casanave

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medium.com/@ls.casanave

Race Description
All

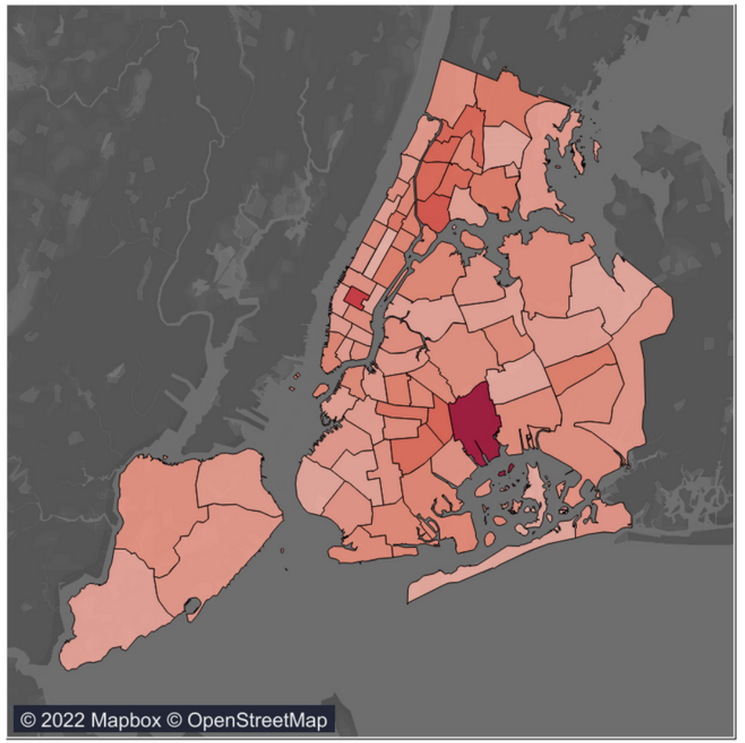
Suspect Sex
- ✔ FEMALE
- ✔ MALE

Physical Force Used
- ✔ UNKNOWN
- ✔ TRUE

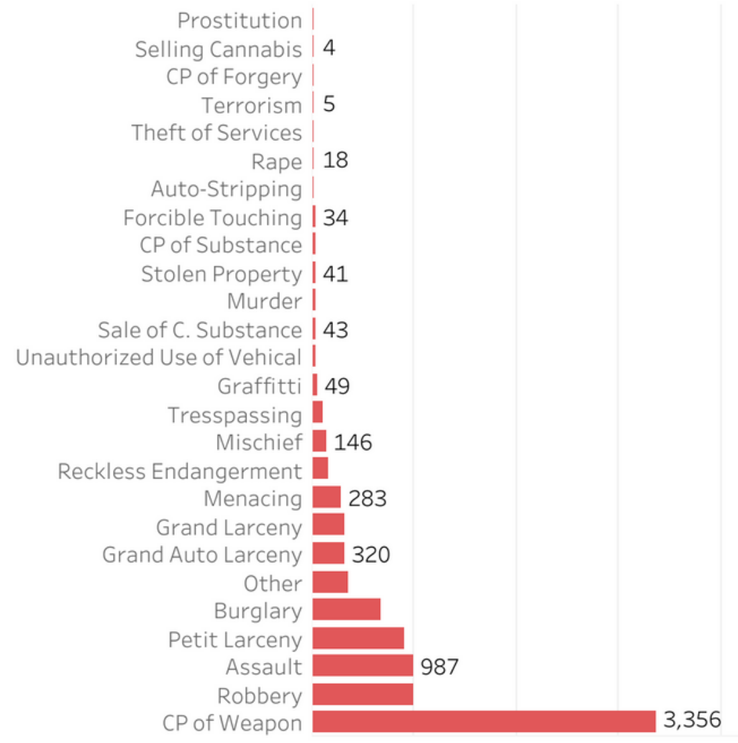
Outcome
- ✔ ARRESTED
- ✔ NOT ARRESTED*

* 'Not Arrested' contains data for both Not Arrested and Unknown Outcomes

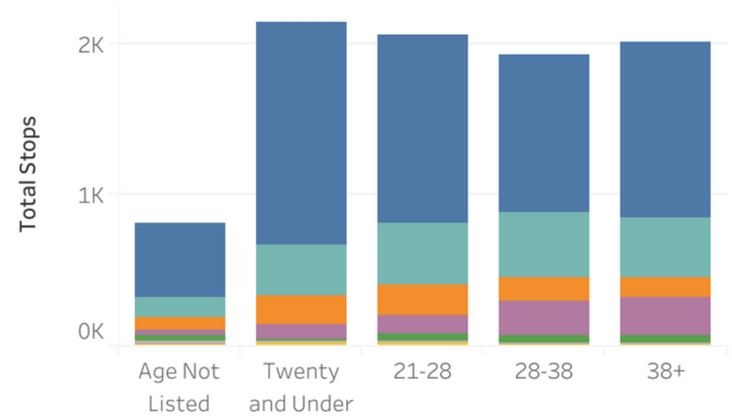
Outcome by Precinct



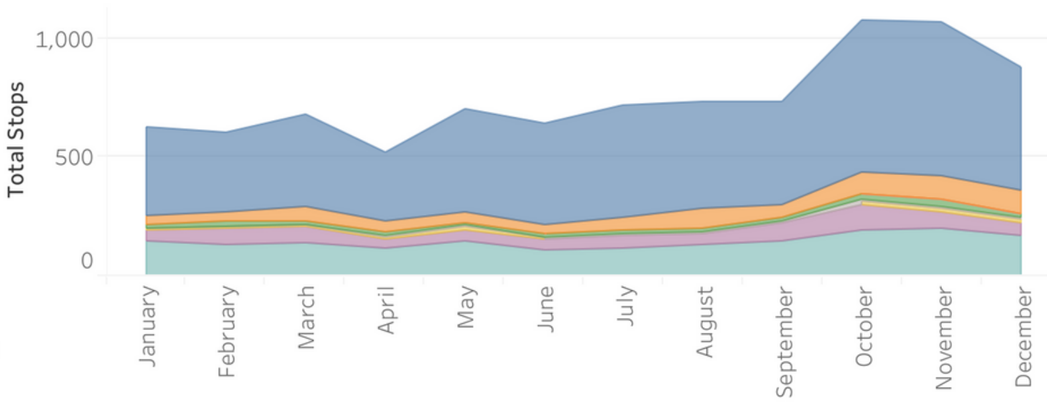
Suspected Crime of Stopped



Ages



Racial Disparity Over Time



BLACK
BLACK HISPANIC
NATIVE
E. ASIAN / PACIFIC
UNKNOWN
W. ASIAN
WHITE
WHITE HISPANIC