Analyzing Possible Predictors of Outcome in Police UOF Incidents

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1. Introduction

Data

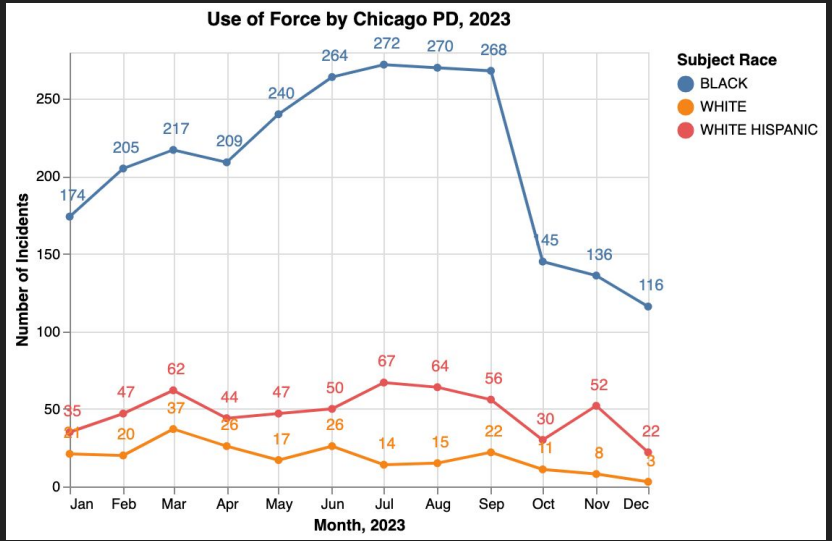
- Use of force (UOF) data uses and overview
- Data collection methods

Project Development and Scope

- Began with noticing patterns when visualizing UOF data
- Chicago, Seattle, New Orleans

Question: What will a regression prediction demonstrate about the relationship between race and UOF incident outcome?

Figure 1: Chicago PD UOF statistics showing the incidents over time for the three most recorded racial groups.



2. Methodology & Data

- Predictive model assumes force level as a response variable; how are police responding to the environmental and demographic factors in a given incident?
- Testing relationship between variables in the data set and level of force used/UOF outcome by evaluating a predictive model with basic train/test split (0.33)
- Used scikit-learn logistic regression because it works well with binary, categorical data; confusion matrix to visualize accuracy of prediciton
- Data cleaning was very labor-intensive, sets had numerous technical problems

2. Methodology & Data

2.1 Chicago

- Zip code allowed to compare with overall population data; not available for other two cities
  - Population data only slightly better predictor (+6%)
- Did not contain use of force level, looked at hospitalization

2.2 Seattle

- Only data set without strictly binary gender option
- Location data somewhat censored

2.3 NOLA

- Contained spatial information (distance between member and subject, weather and lighting conditions) but not location
- Collects data based on incident, not individual

3. Results

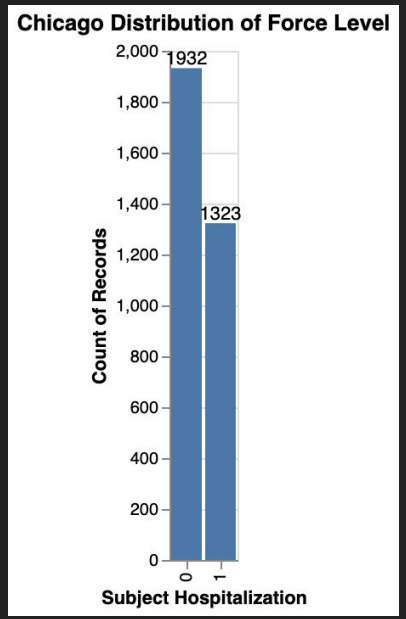
- The number of UOF incidents in a given year in each city tends to very roughly track with the city's population increase

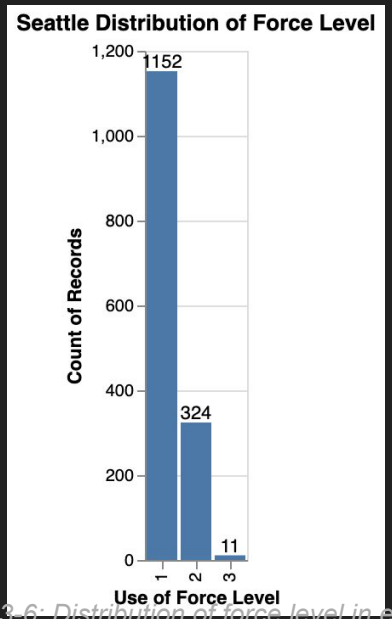
Figure 2: Prediction accuracy of the regression models for each city.

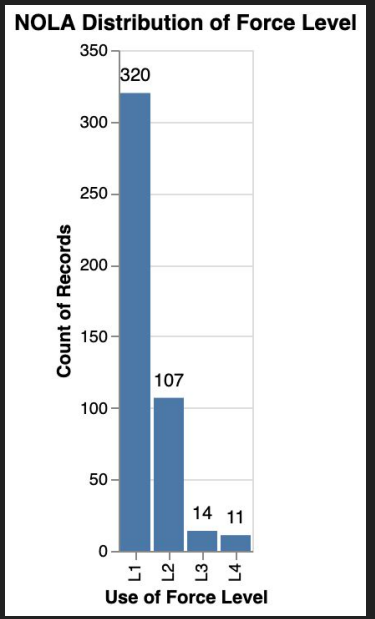
	Chicago	Seattle	NOLA
Prediction accuracy:	53.2%	77.4%	69.3%

3. Results

- Overall, models tend to under-predict higher use of force levels; make up a small portion of overall data but important to focus on





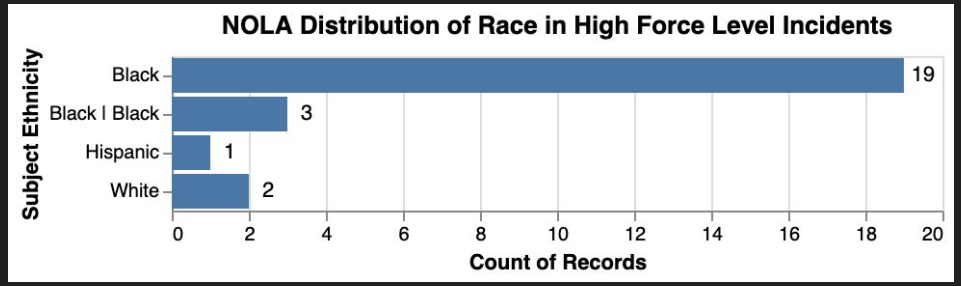


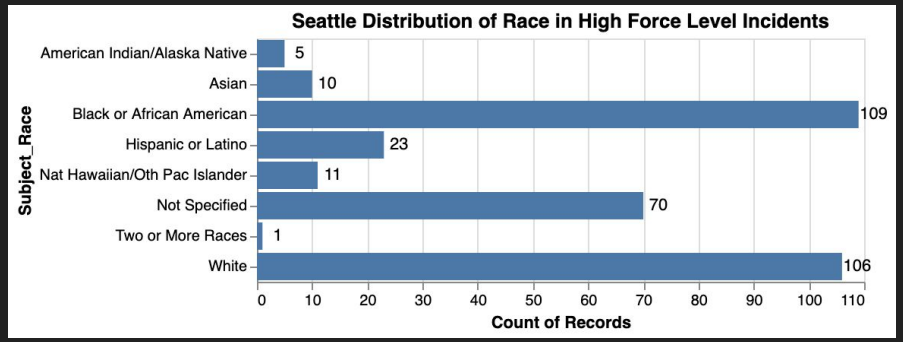
Figures 3-6: Distribution of force level in each city.

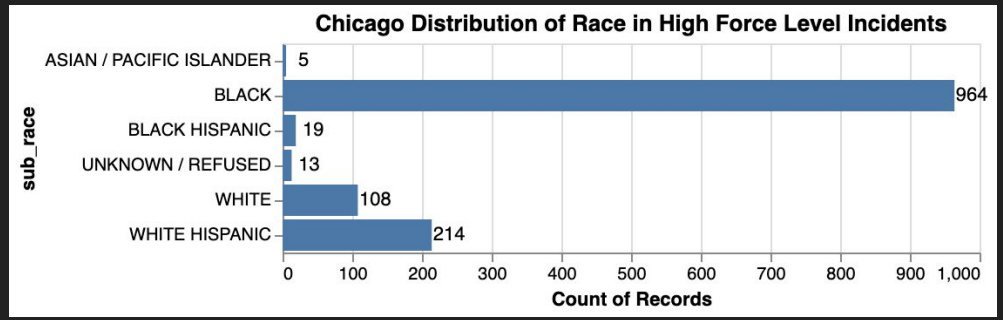
3. Results

- There is a significant racial disparity in use of force incidents, particularly in high-level force incidents
- Black civilians are overrepresented in Chicago and NOLA.

Figures 7-9: Distribution of Race in incidents with high force level used.







4.1 Conclusions

- Race plays a significant role in police UOF data and in some cities can be used as a predictor of level of force with nearly 70% or 80% accuracy; however, further research can determine how this compares to other aspects of the data

- With Capstone project, will likely look to comparing other non-demographic variables as possible predictors
    - Whether subjects are armed

- Data science and empirical knowledge is only one aspect of understanding and addressing this issue

4.2 Limitations and Further Research

- Location data in more cities would allow for further comparison with overall population like in Chicago
- Standardizing categorical variables not only across police districts, but within districts
- Other types of regression (some personal limitations here)

4.2 Limitations and Further Research

- Further work must be done on addressing underlying causes and patterns of violence in police systems

- Scope and size: this project only accounts for an overview of three large metropolitan areas
    - SToPA Lab

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