



DS
4A

EMPOWERMENT

Assessing Crisis Intervention Training

Presented by : Team CSI (129)

Bianca Egbe, Lamne Cleo Johnson, Kachi Ogbonnaya, Folake Olatoye-Ojo, Raul Pena, Chris Rodriguez

Agenda

- Introduction
- Objective (the challenge)
- Exploratory Data Analysis
- Insights gleaned from Analysis
- Classification Prediction Ensemble Machine Learning
- Conclusion & Recommendations
- Q & A

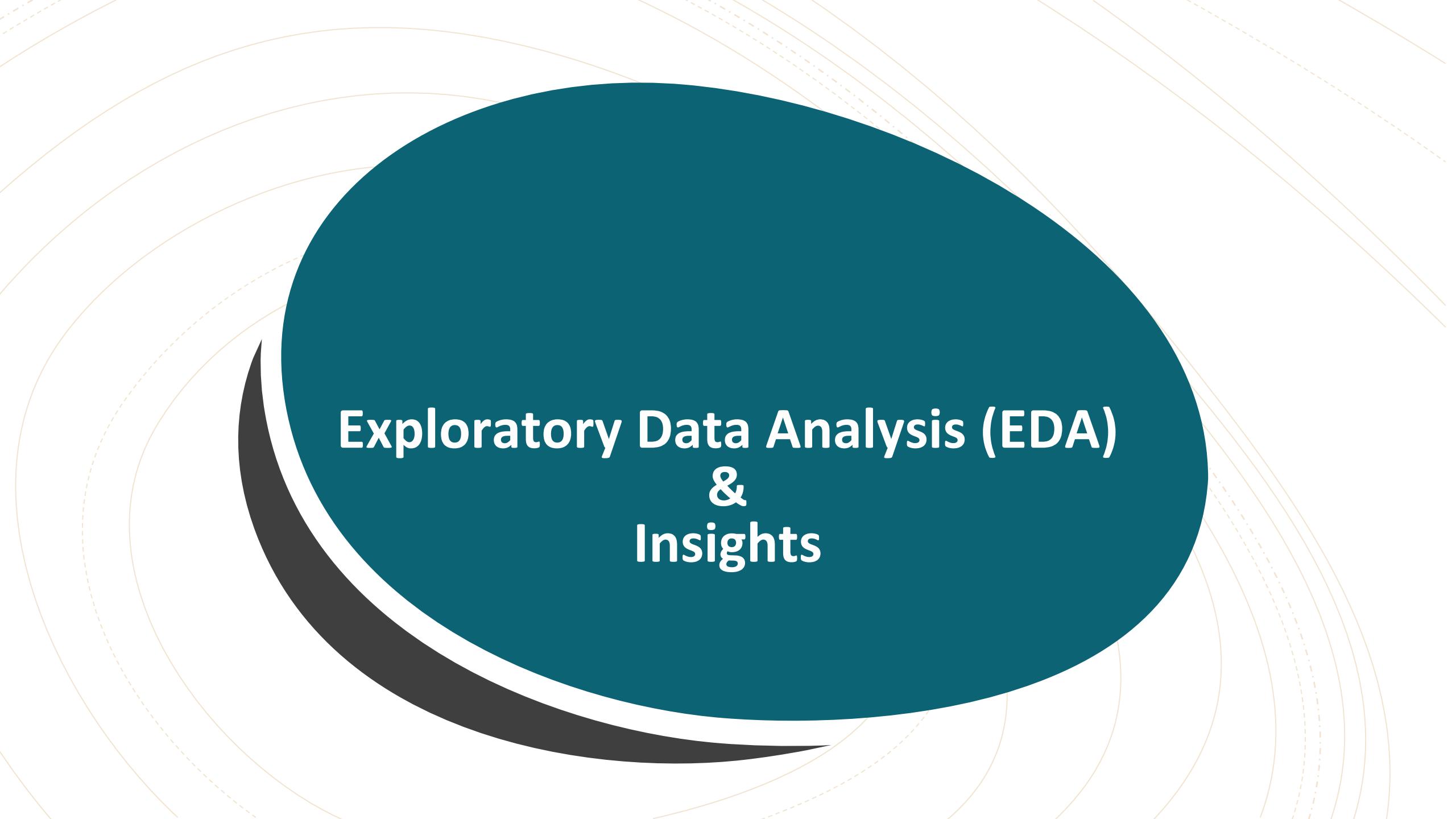
Objective

Quantify the impact or lack of impact of CIT on crises that resulted in Level 2 or Level 3 uses of force (UOF)

Overview

- Since 2012, Seattle's Police Department (SPD) has been under a federal consent decree. On its first assessment in 2011, the Department of Justice found that SPD used force consistently instead of consistently attempting to de-escalate crisis encounters.
- In 2014, SPD developed its Crisis Intervention Training (CIT) and implemented the policy that all SPD officers will receive 8 hours of CIT annually.
- Why does this training matter?
 - Provides the staff with more tools to do their job safe and effectively.
 - Keeps police focused on the UOF during encounters
 - Produce cost savings by targeting training investments in the right places
 - Reduced risk of serious injury or death during police encounters

- **Level 1** – Force that causes transitory pain or the complaint of transitory pain.
- **Level 2** – Force that causes or is reasonably expected to cause physical injury greater than transitory pain but less than great or substantial bodily harm.
- **Level 3** – Force that causes or is seriously expected to cause great bodily harm, substantial bodily harm, loss of consciousness or death.

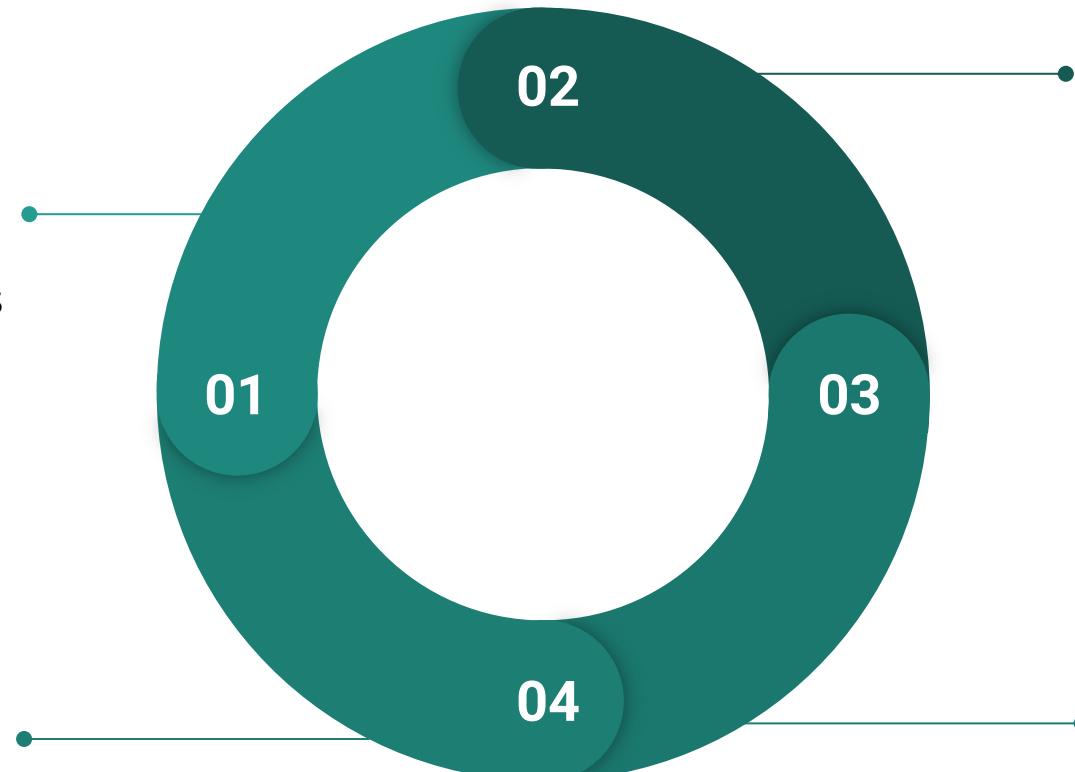


Exploratory Data Analysis (EDA) & Insights

The Process

Data Extraction

- Applied the Use of Force (UOF) Dataset, provided by SPD.
- Researched a different dataset online with features and merged both datasets on the common FileID column.
- Extracted important features from the Terry Dataset provided by SPD and merged with UOF on common column.



Data Interpretation Charts & Graphs

- Created Bar Charts, Line Charts, Box plots, stacked area plots and heat map.
- Used Power BI to create plots and dashboard

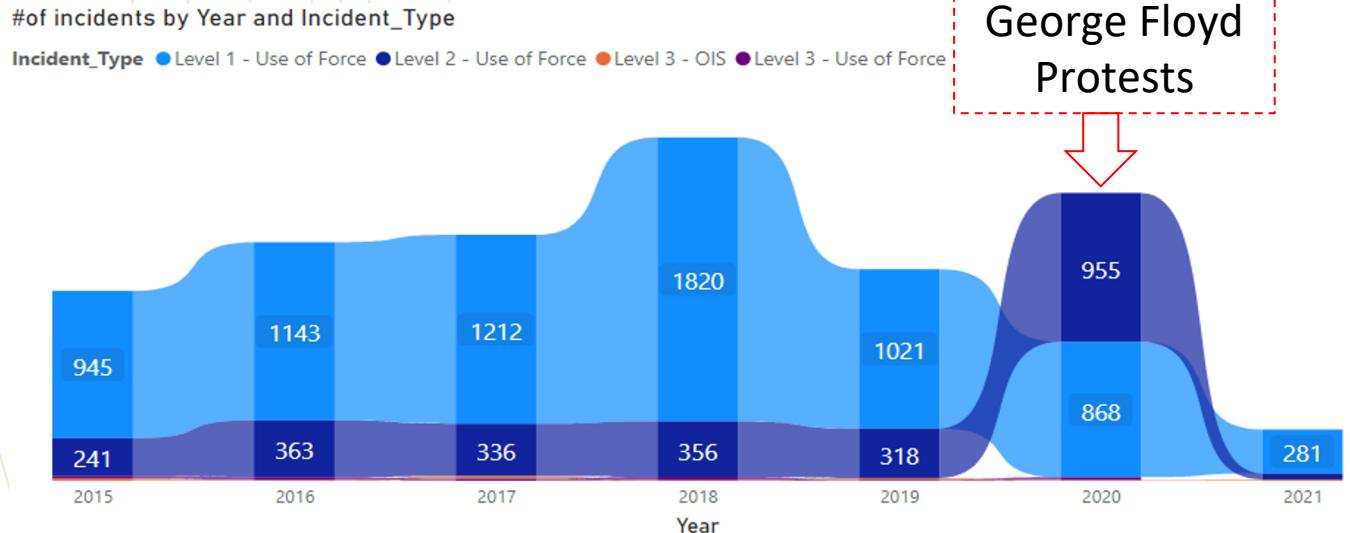
Data Profiling and Cleansing

- Analyzed each column for missing data (null values).
- Dropped rows with missing values.

Data Transformation

- Changed the data types and prepared the dataset for analysis and modelling.

Issues with Training during the Covid-19 pandemic



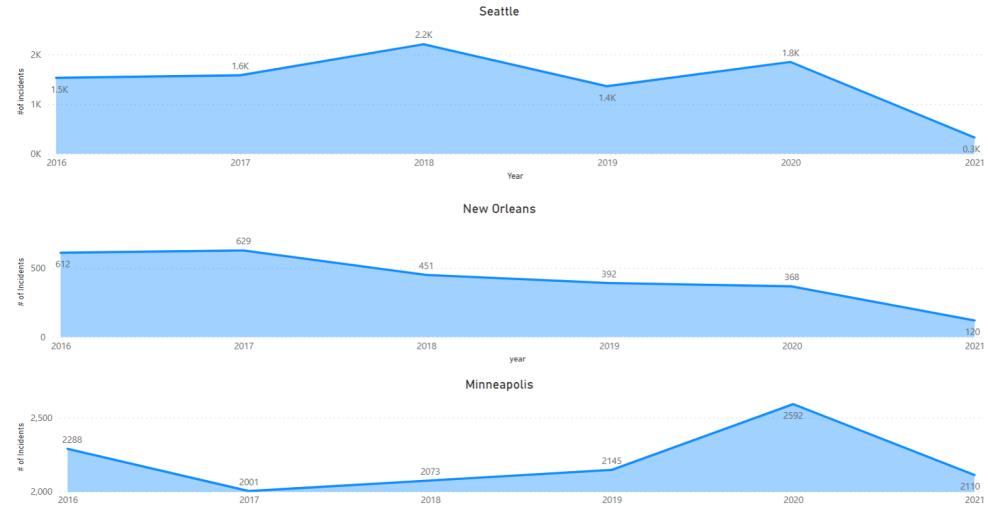
Comparables and Covid Effect

COVID-19 Effect

In March 2020, CIT training was suspended due to the covid-19 pandemic. The decrease in CIT certified/ non-certified from January to December 2020 correlates with an increase in use of force incidents for the same period compared with other years.

Comparables (Minneapolis and New Orleans)

Cities as Minneapolis, saw a large increase in incidents of use of force during the same time period of 2020 due to the George Floyd protests, while cities as New Orleans saw a steady decline for the same period.



Effectiveness of Police Crisis Intervention Training

Analyzing Trends

Incident_Type	Level_1_UOF	Level_2_above_UOF
CIT_Certified		
N	0.601195	0.556376
Y	0.398805	0.443624

p = 7.325678396296974e-07 significance = True

- **Level 1** – Force that causes transitory pain or the complaint of transitory pain.
- **Level 2** – Force that causes or is reasonably expected to cause physical injury greater than transitory pain but less than great or substantial bodily harm.
- **Level 3** – Force that causes or is seriously expected to cause great bodily harm, substantial bodily harm, loss of consciousness or death.

- Data analysis:

- The trends of CIT by officer age groups, gender, race and precinct.

- Hypothesis testing: Is CIT effective in reducing the number of incidents?

- Conducted a chi-square test (results below) on the whole UOF dataset including type 1 to 3 events, and determined that officers that are CIT certified are less likely to use force than non-CIT certified officers.

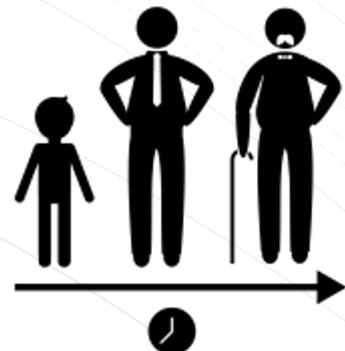
- Other important insights: Variability across location, age, gender, and race groups.

- Determined the impact of CIT across the different officer age, gender, race groups, and precinct. A logistic regression model was also used to determine the impact of CIT.

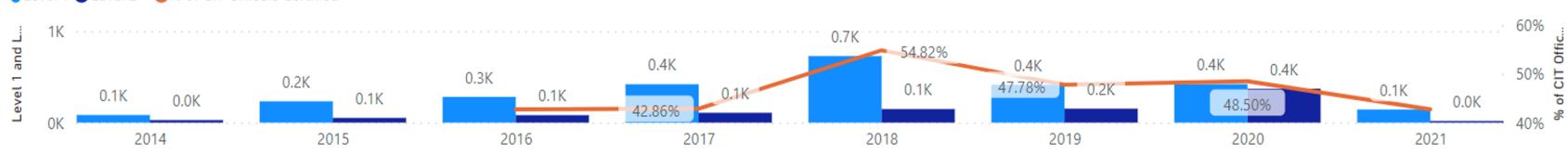


Age of Cohort Analysis

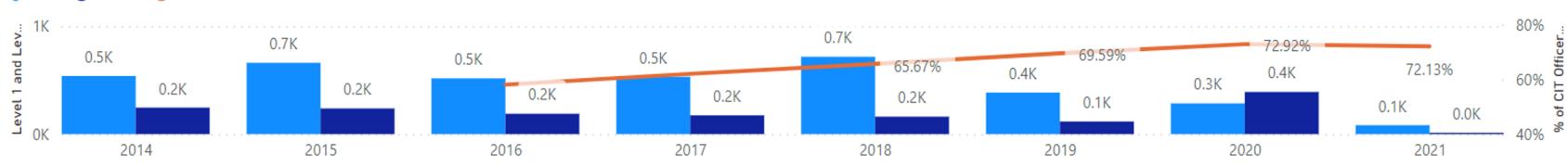
Year	23-34yrs Old	35-44yrs Old	45-54yrs Old	Over 54yrs Old	Total
2016	28.52%	-20.18%	-44.38%	-41.67%	-22.15%
2017	43.54%	-1.29%	-19.86%	-24.18%	3.20%
2018	69.08%	25.62%	39.38%	39.13%	39.61%
2019	-34.61%	-42.05%	-41.27%	-41.67%	-38.31%
2020	37.88%	28.43%	41.08%	-19.64%	35.84%
2021	-78.82%	-84.52%	-85.82%	-80.00%	-82.23%
Total	-3.34%	-18.13%	-26.46%	-28.65%	-15.61%



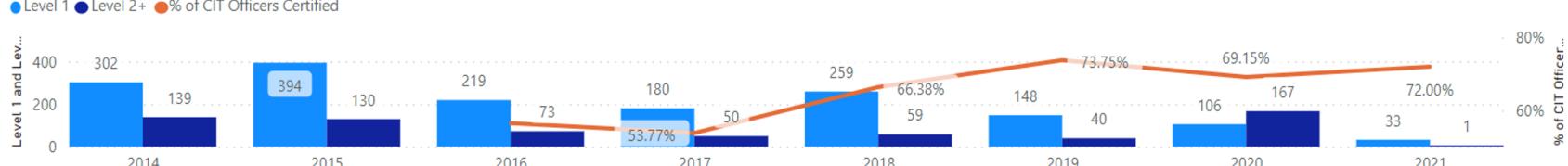
● Level 1 ● Level 2+ ● % of CIT Officers Certified



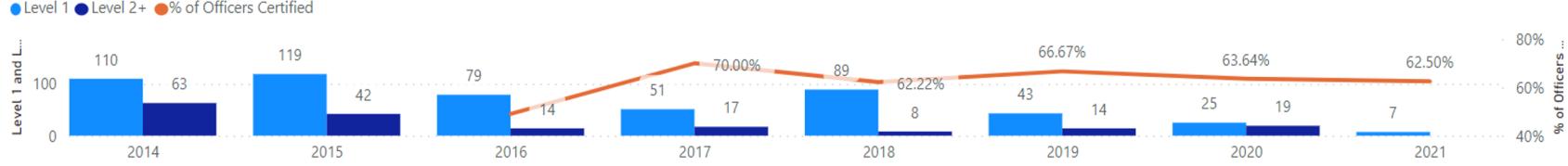
● Level 1 ● Level 2+ ● % of CIT Officers Certified



● Level 1 ● Level 2+ ● % of CIT Officers Certified



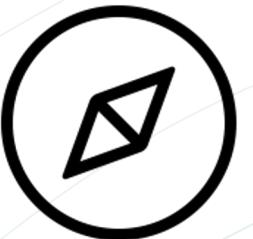
● Level 1 ● Level 2+ ● % of Officers Certified



- Officers within the 23-34 yrs age group received the least number of CIT certifications at 40-55% range while exhibiting the **lowest decrease overtime at (3.3%) vs. (~18-29%)** across all other age groups.

- For Level 2+ incidents**, we saw a >100% increase over 2019 levels. The increase was less pronounced for the cohorts over 45 years old.

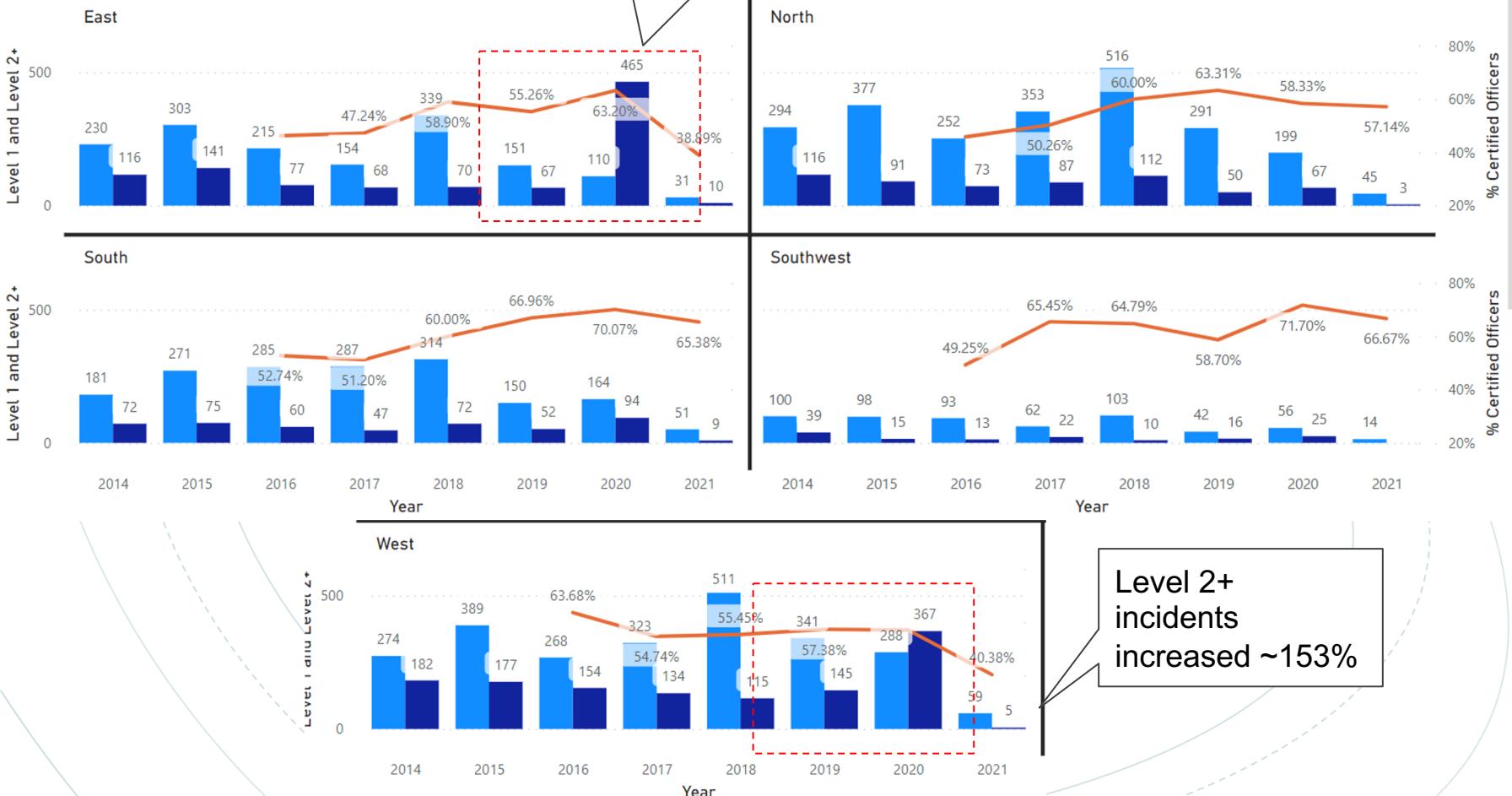




Precinct Distribution Analysis

Level 1, Level 2+ and % Certified Officers by Year and Precinct

■ Level 1 ■ Level 2+ ■ % Certified Officers

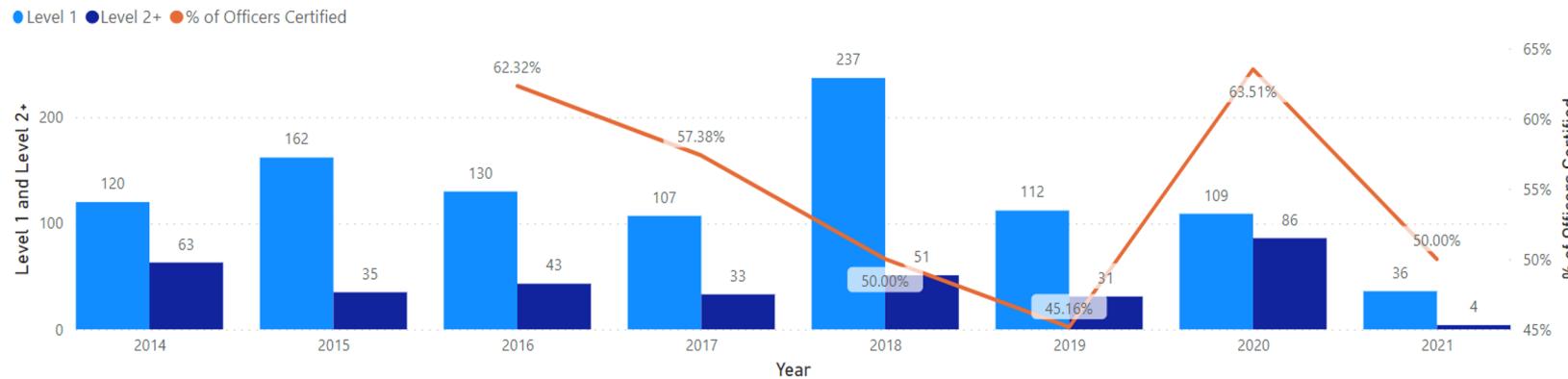
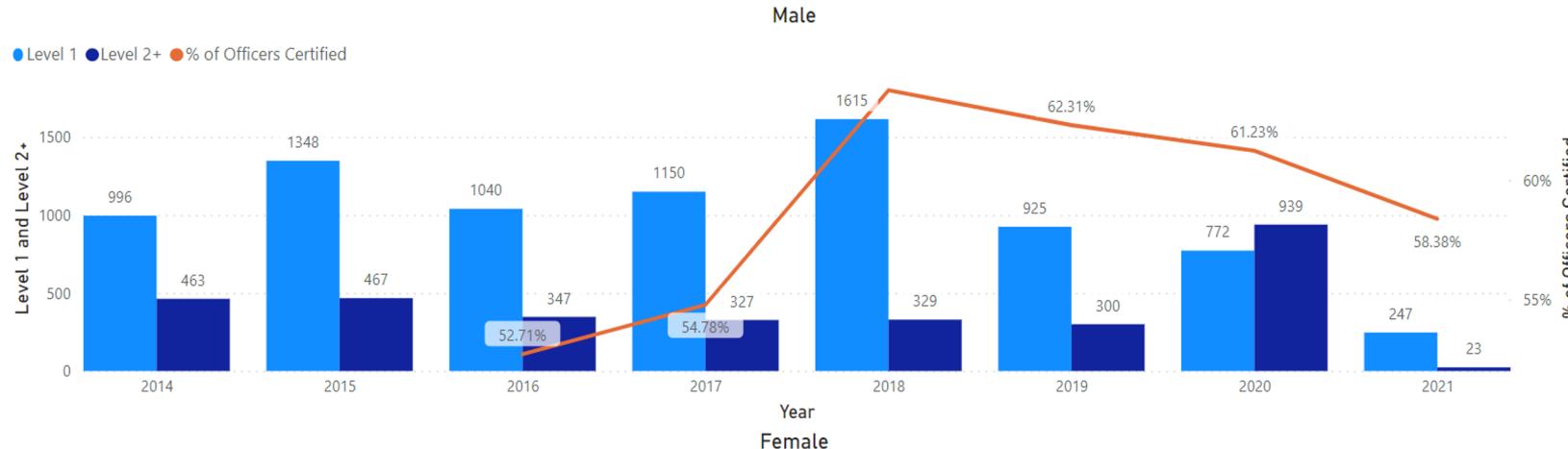
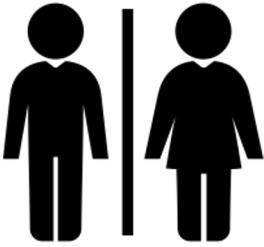


- Officers within the East and West precinct saw a significant increase for their Level 2+ incidents vs the other precincts for the year 2020.
- Asymmetries in the level of officers that are CIT certified, the number of officers certified are ~10 points lower in the West precinct vs. the other locations.





Gender Asymmetry Analysis

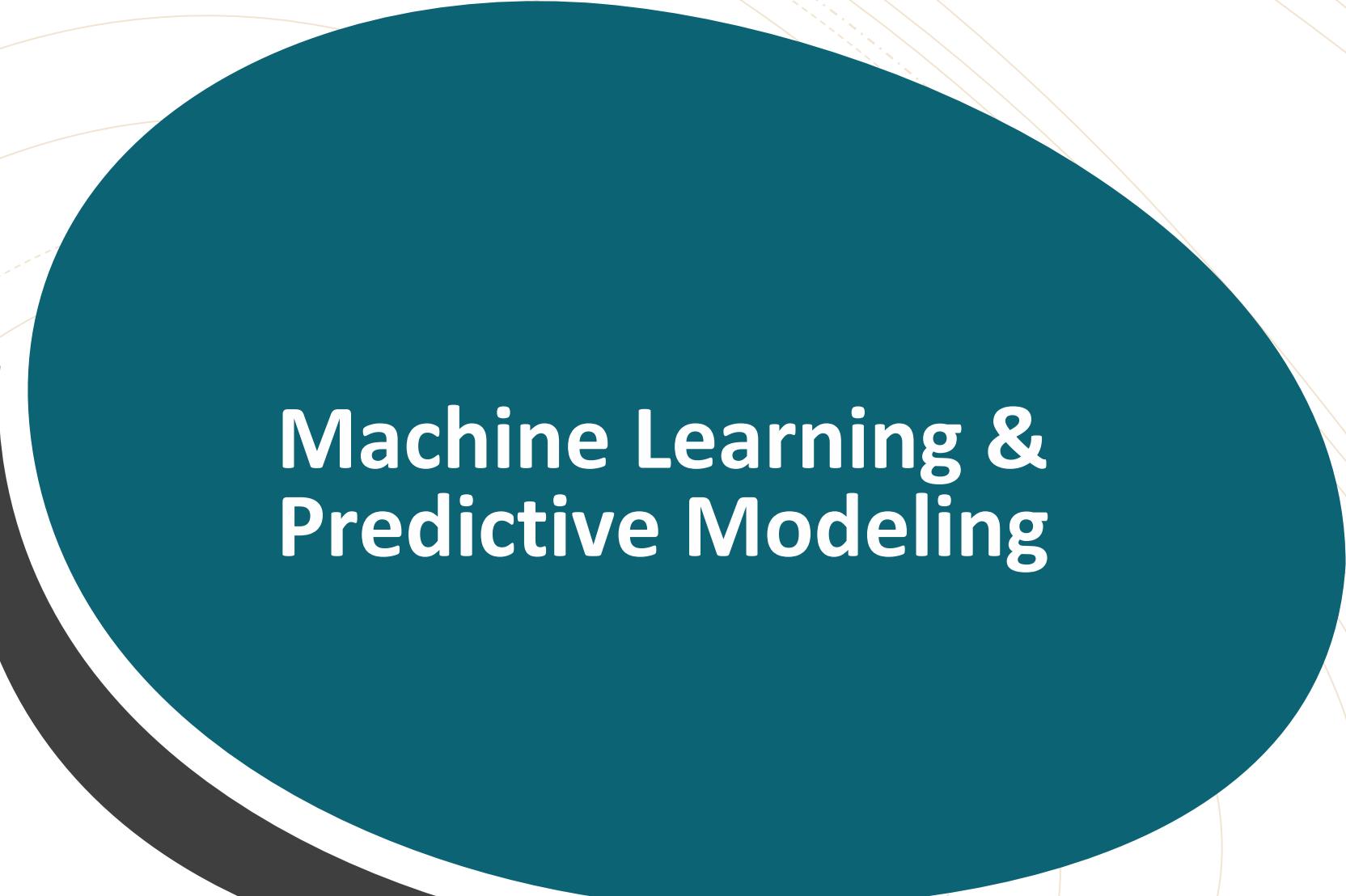


Male

- % CIT-certified officers increased from 2016 to 2018 and decreased afterwards.
- **Level 2 UOF incidents decreased by 35% between 2014 and 2019, however it increased by 213% in 2020.**

Female

- % of certified officers decreased between 2016 to 2019, however it increased in 2020.
- **Level 2 UOF incidents decreased by 51% between 2014 and 2019, however it increased by 177% in 2020.**



Machine Learning & Predictive Modeling

Classification Prediction Machine Learning Models

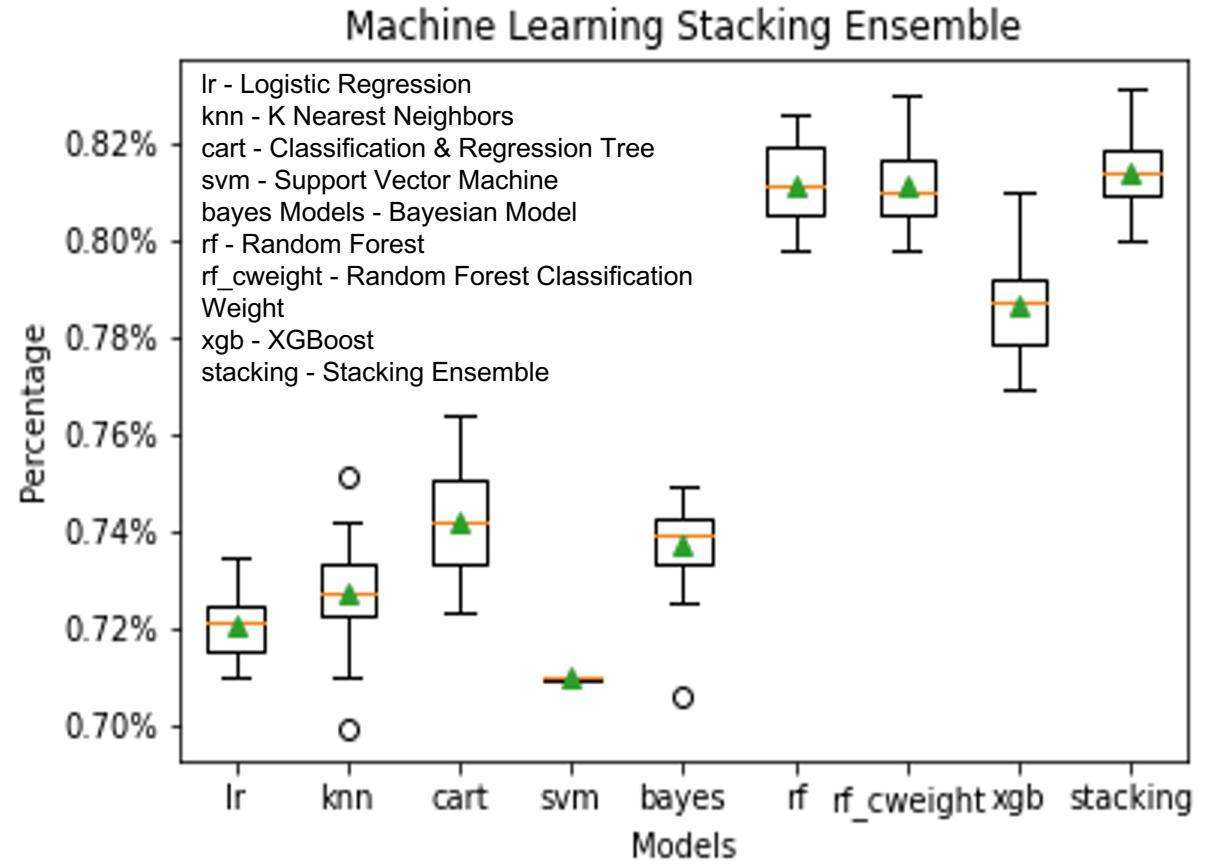
Predicting if a Use of Force will occur by providing an accuracy score based on the inputs

Best Model

- Ensemble Stacking Accuracy Score **82%** with standard deviation of **0.007%**.

Next Steps

- Add new features to identify any significant value.
- Customize Stacking Ensemble.
- Develop Stacking Ensemble for Deep Learning Neural Networks.



Conclusions & Recommendations

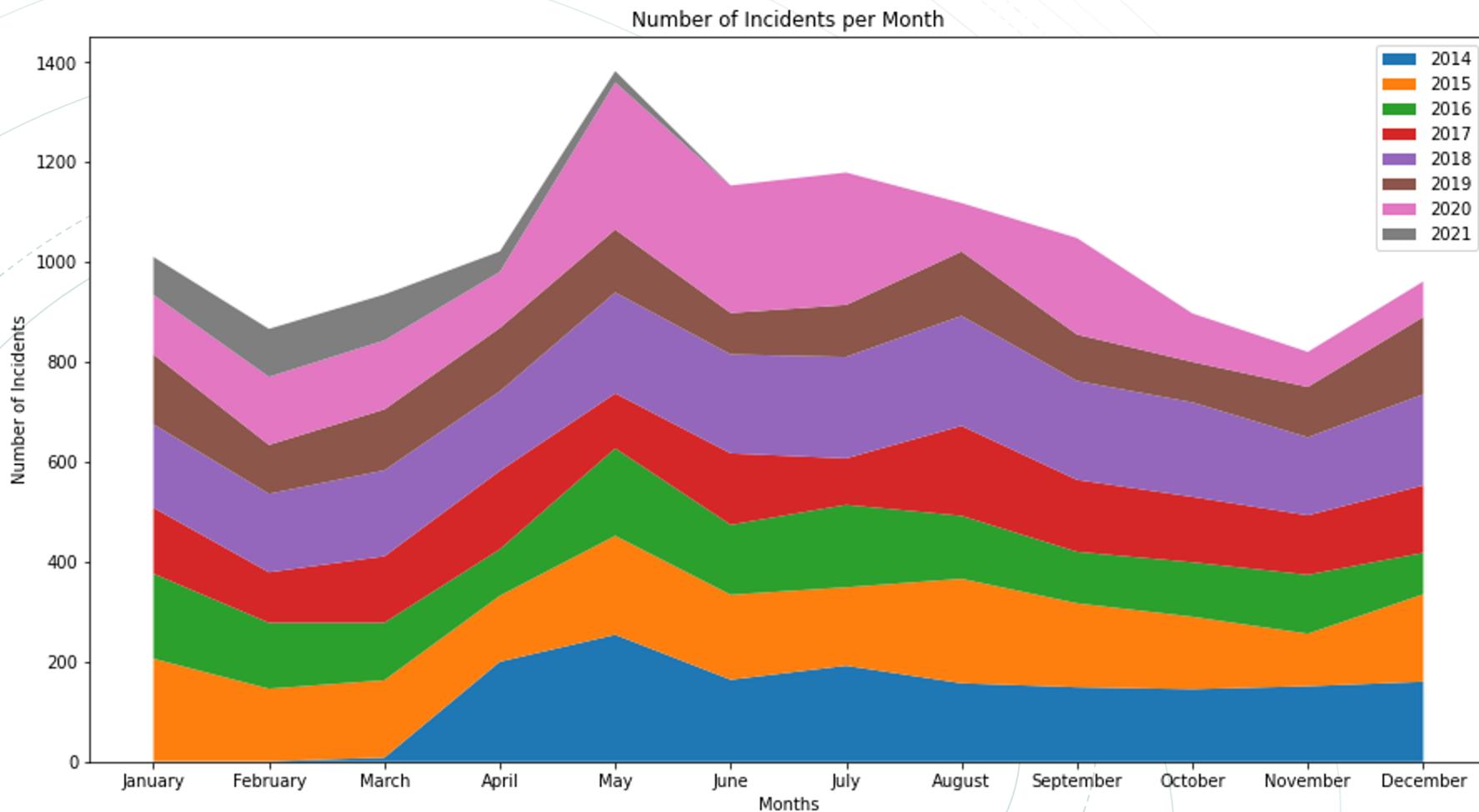


- The West Precinct has the lowest amount of CIT-Certified officers but also the highest amount of use of force incidents. Officers within the 23-34 age group were the least trained and only reduced their use of force incidents by 2% overall vs 35% across all the age groups. **We recommend that more efforts should be made to train Officers in the West Precinct and within the 23-34 age group.**
- In 2020, the summer protests coincided with the suspension of CIT and resulted in **a significant increase in crisis incidents involving Level 2 and above UOF**.
- There was an increase in Use of force incidents between May and August, **we recommend providing the training just before the beginning of summer months (March/April) to minimize the UOF incidents (refer to Appendix)**.
- When comparing SPD data collection with other police departments (NYPD), **we recommend that SPD collect additional UOF data such as reason for use of force, light condition, subject influencing factors, and subject height/build.**
- Based on feature input the model outcome has an 82% accuracy at predicting if a Use of Force will occur. This information can help develop strategies for reducing the Use of Force incidents.



Q & A

Appendix



Number of UOF Incidents per Month From 2014 to 2021 in Seattle