



CRIME SCENE DO NOT

# Modeling Crime in Colorado

Flatiron School

**Capstone Project**

**Authors:** Elena Kazakova

**Cohort:** DS02222021

**Instructor:** James Irving



# Project Goals

- Modeling crime rates-foundation for shaping:
  - **resources allocation for law enforcement**
  - **public policy**
  - **preventive measures**
- General and categorical crime rate:
  - **provide transparency**
  - **create easier access**
  - **expand awareness**
- Web application:
  - **data available through visualizations and statistics**

CRIME SCENE DO NOT

# Data



- 44 tables available for download
- API available (but no current data)
- Data:

- Offense information

- ✓ **Date/Time**
- ✓ **Category**
- ✓ **Weapon**
- ✓ **Bias**

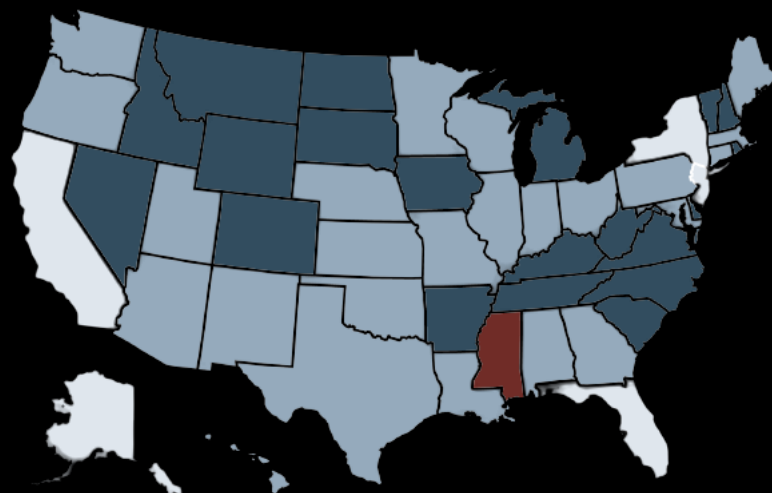
- Reporting agencies information

- ✓ **Geographic data**

- Victim demographic data

- Offender demographic data

**FBI**  
**Crime Data Explorer**  
**(2009-2019)**





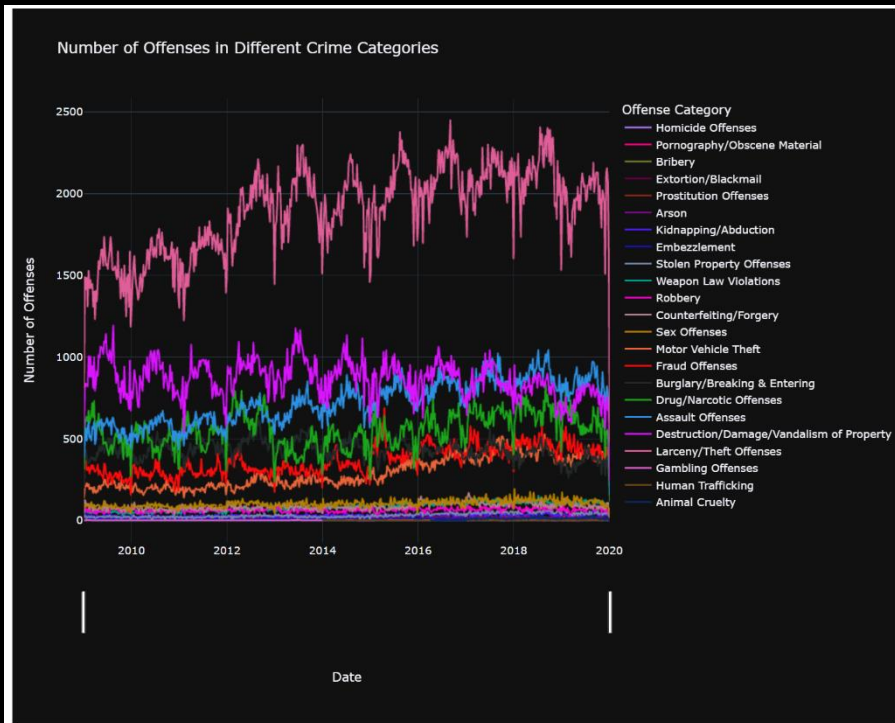
# Categories of Offenses

Offenses  
3201143

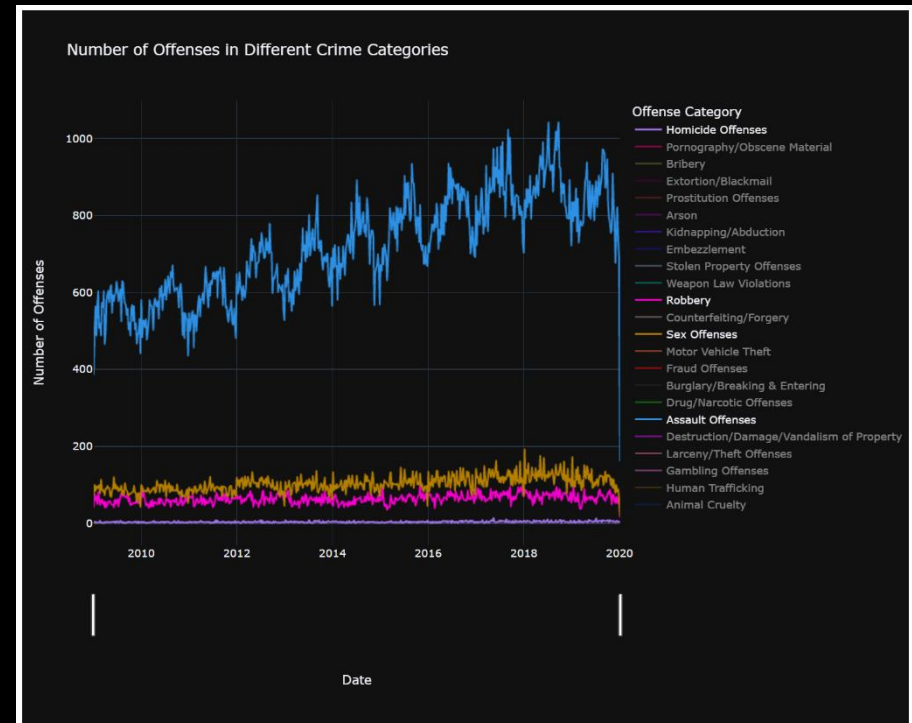
Victims  
3229640

Offenders  
3197991

## All Crimes



## Violent Crimes

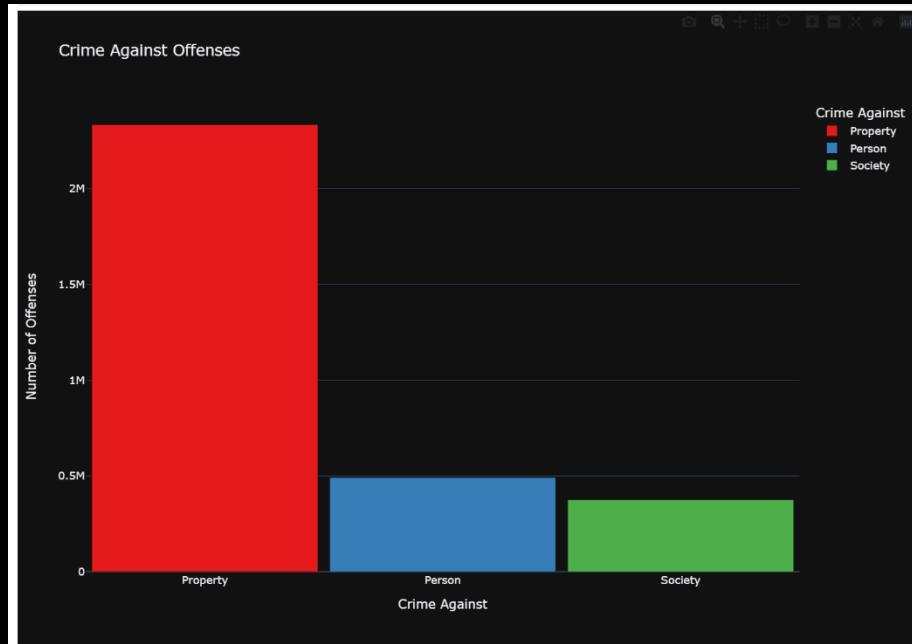


CRIME SCENE DO NOT

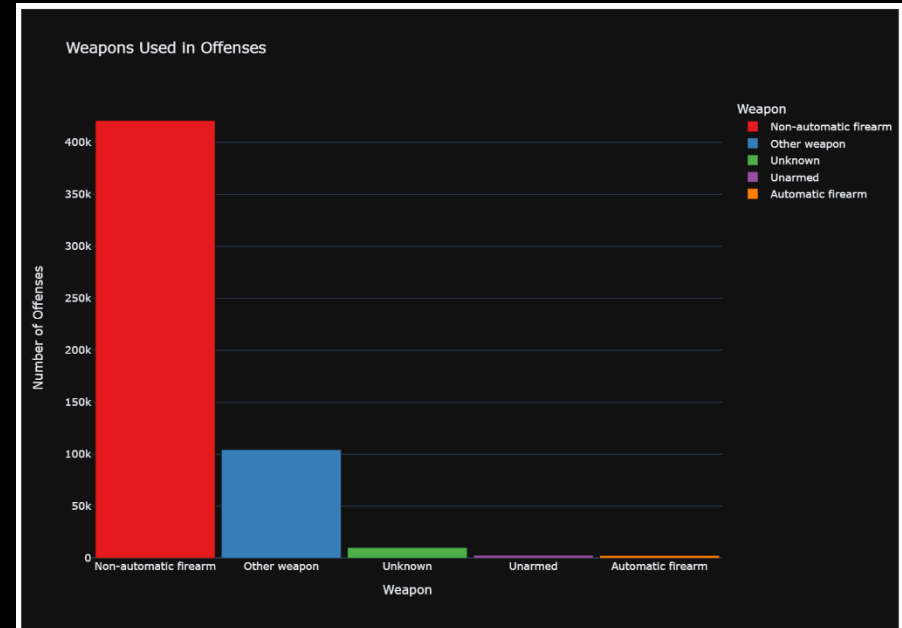
# Target and Weapons



## Crimes Against

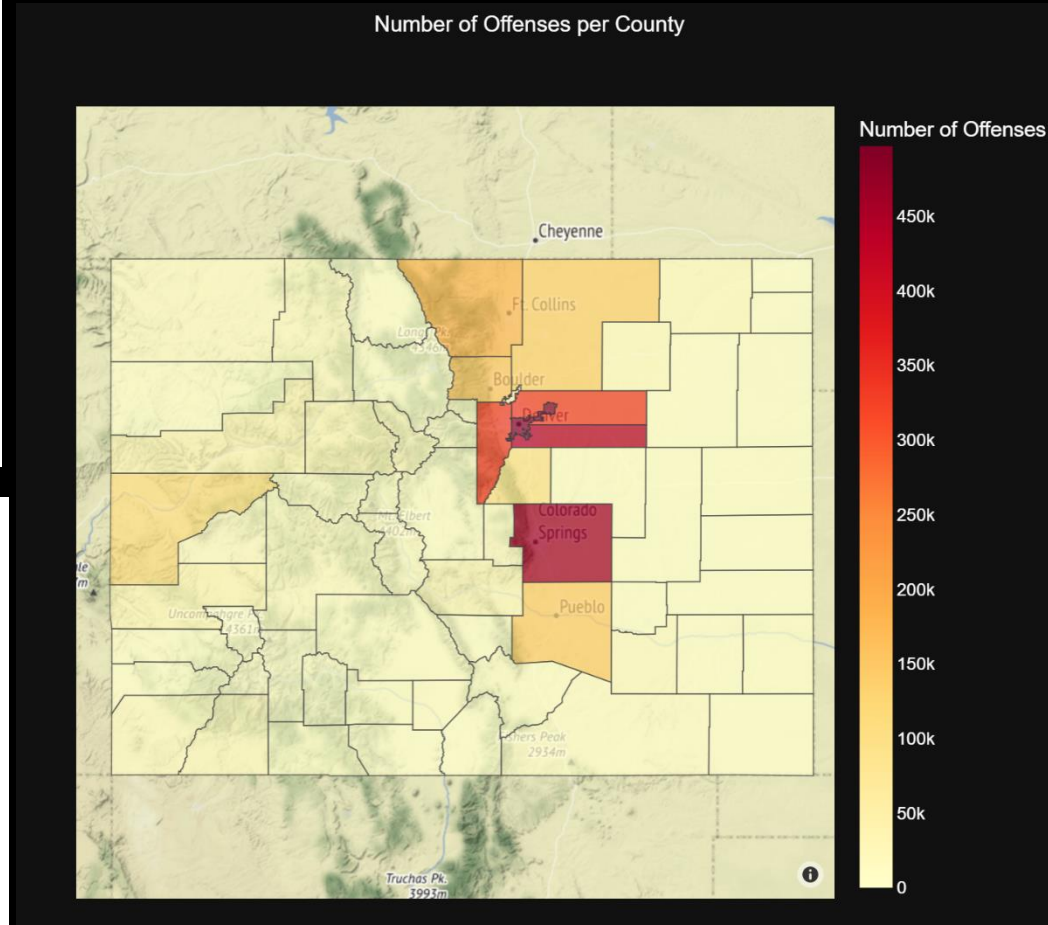
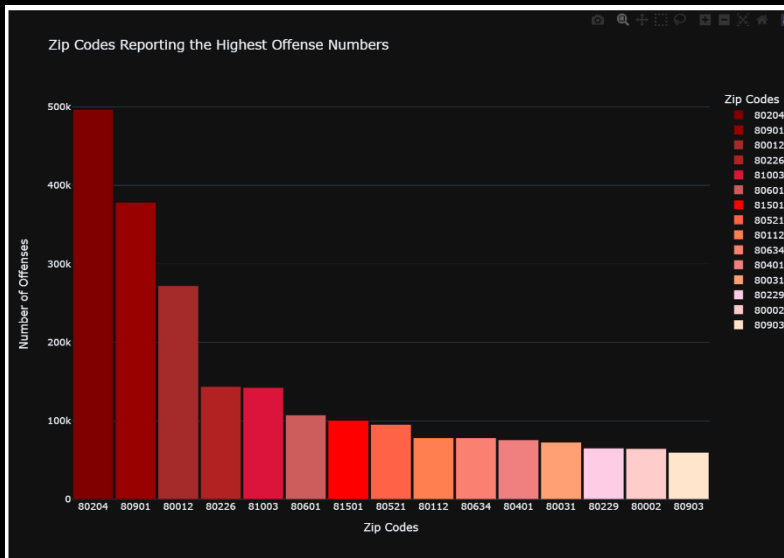
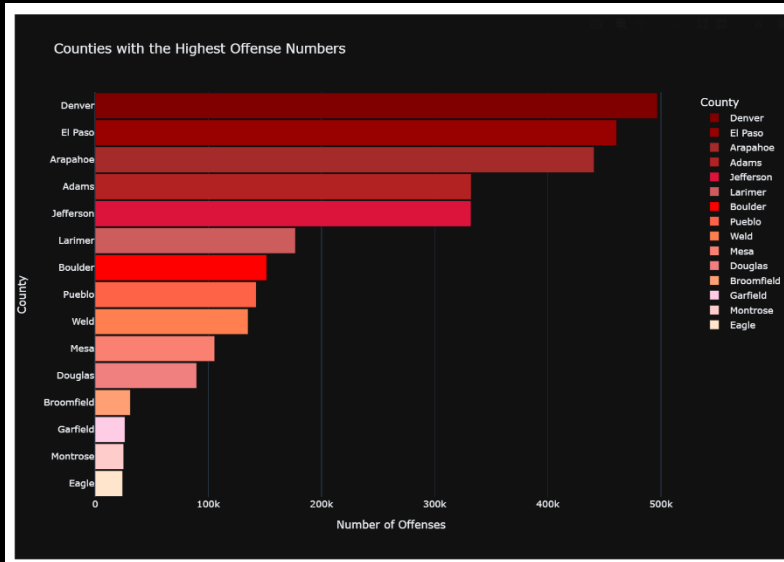


## Violent Crimes



CRIME SCENE DO NOT

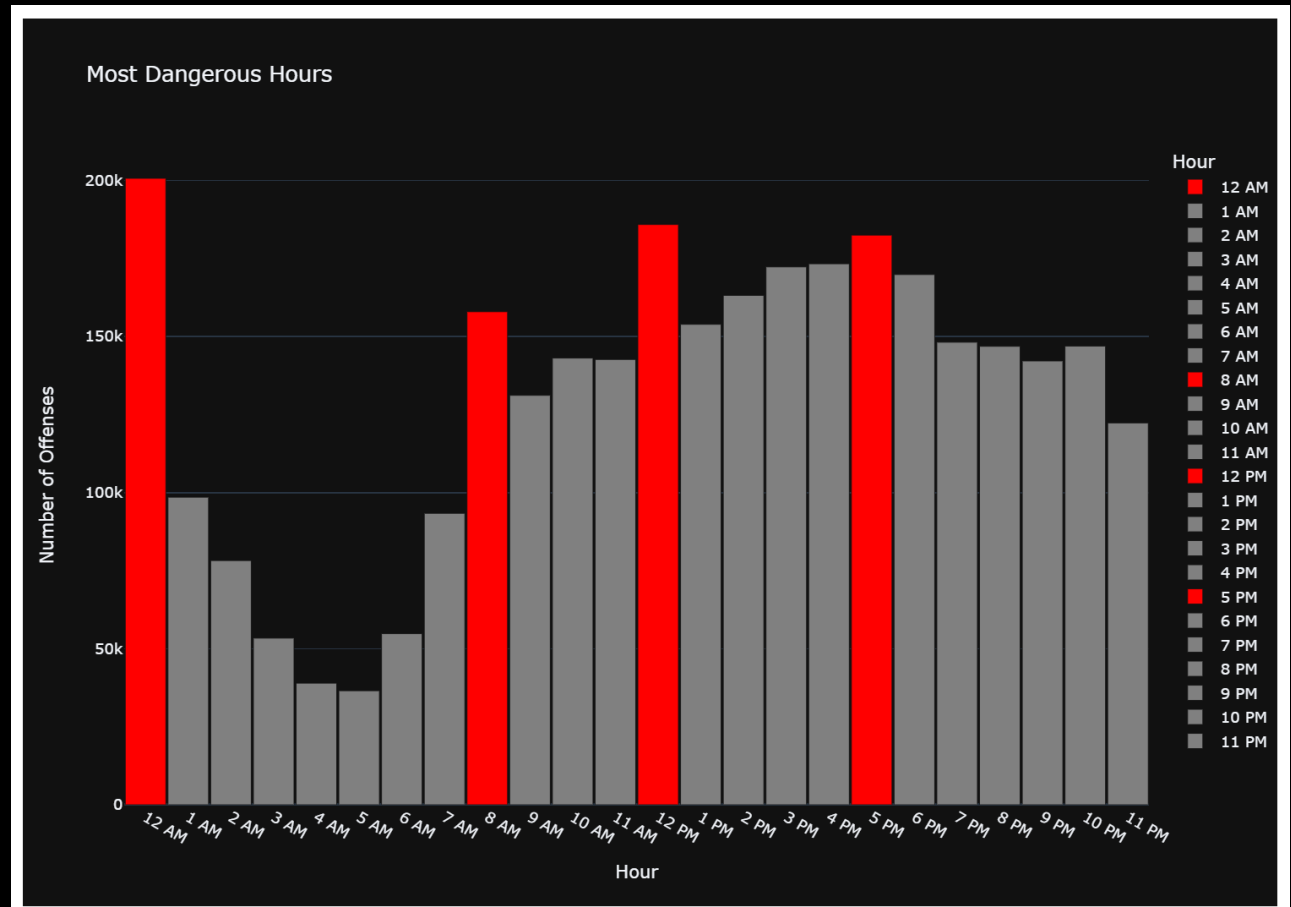
# Geography of Crimes





# Crime Timing

- ✓ **Midnight**
- ✓ **8 AM**
- ✓ **12 PM**
- ✓ **5 PM**

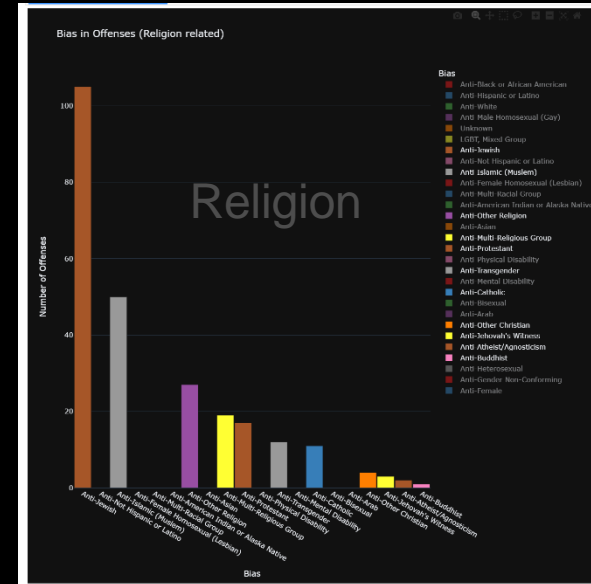
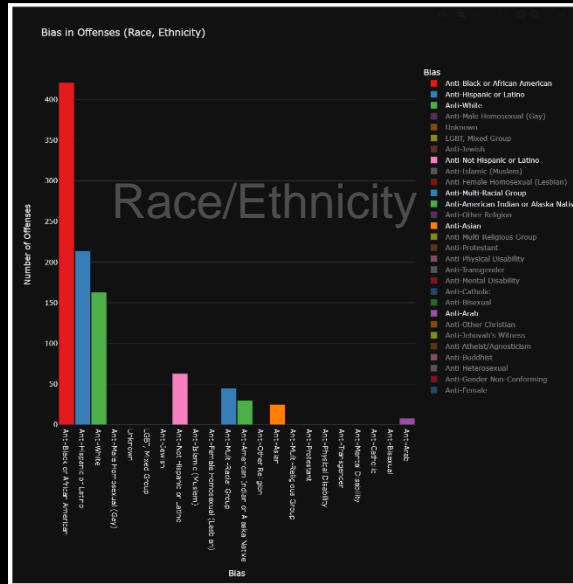
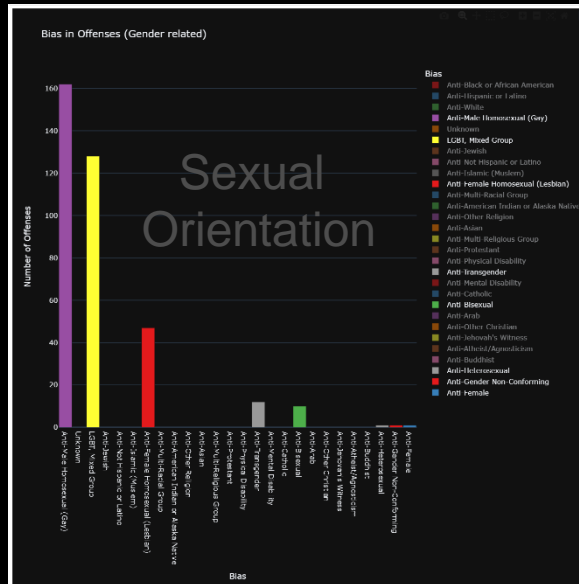
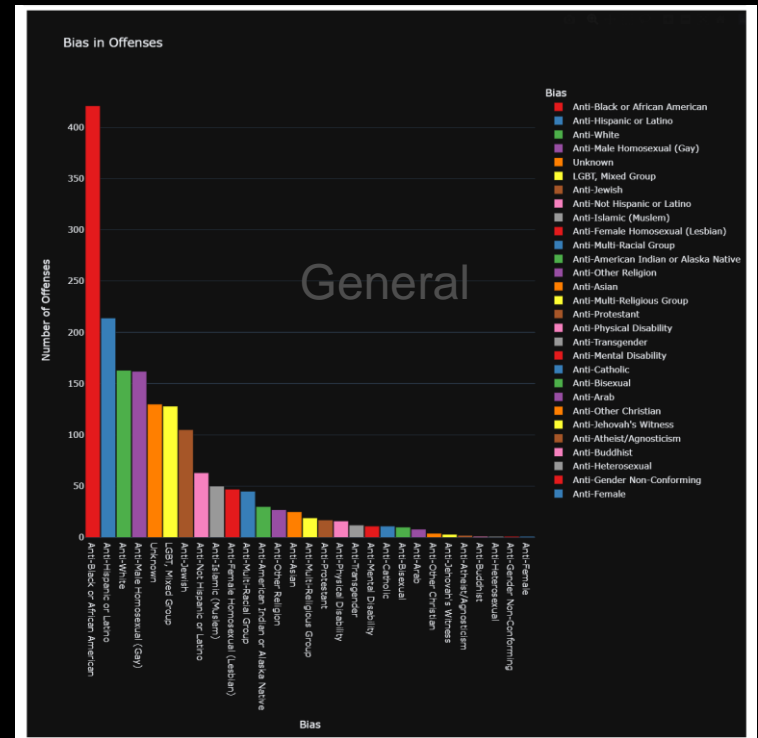




CRIME SCENE DO NOT

# Bias Motivation

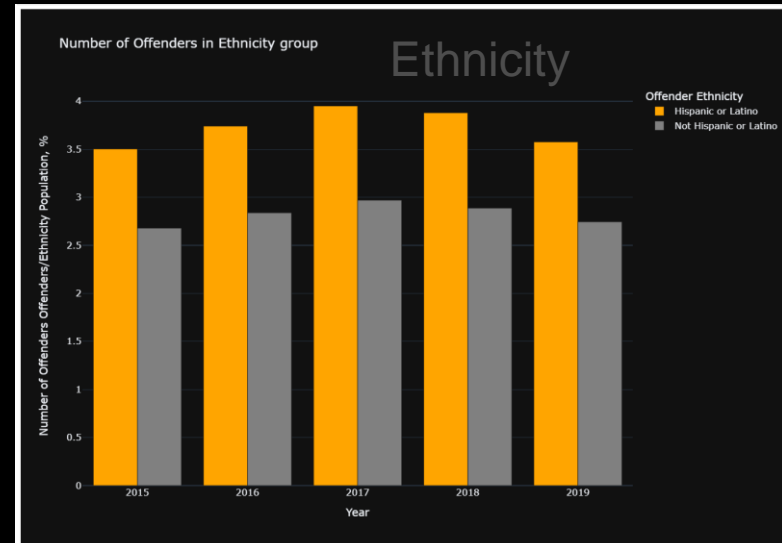
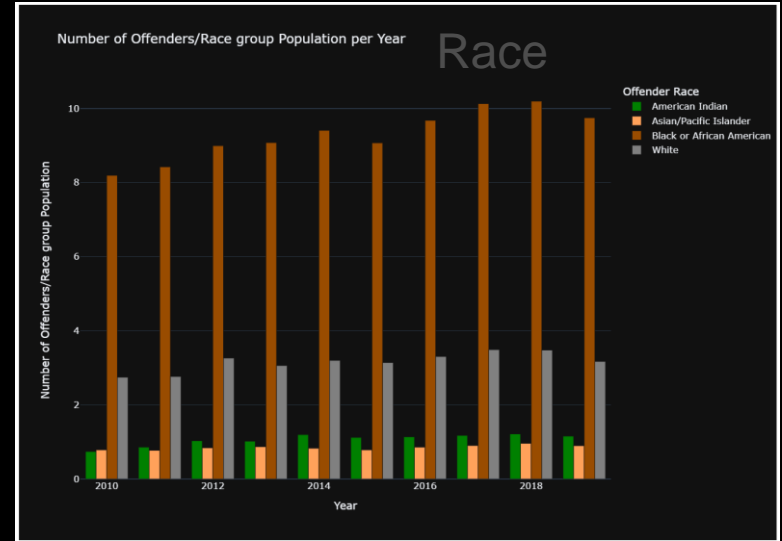
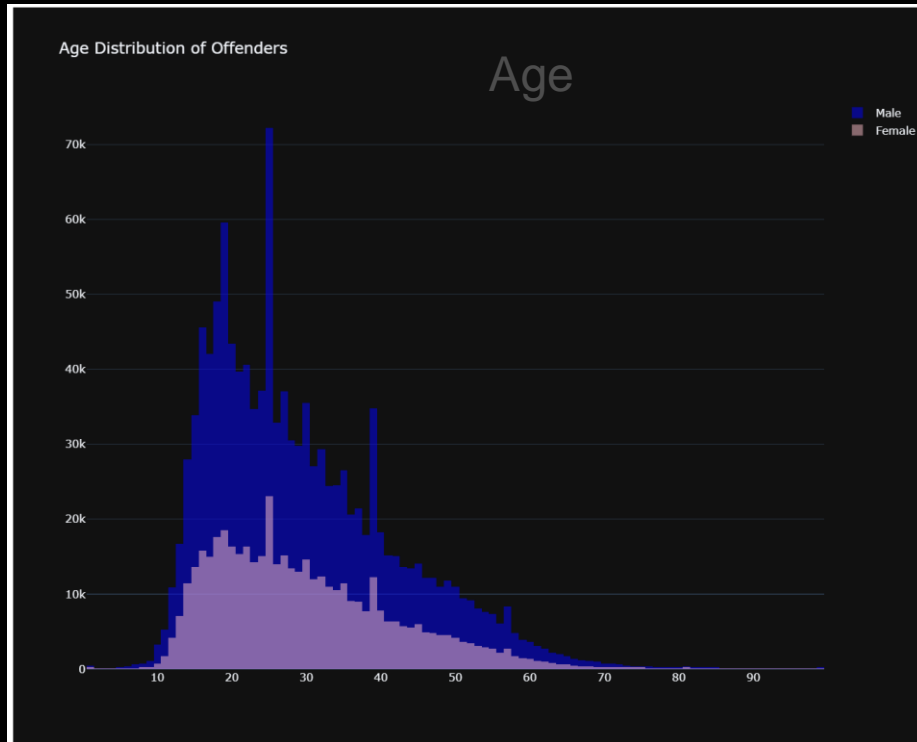
Offenses with Bias Recorded  
1727





CRIME SCENE DO NOT

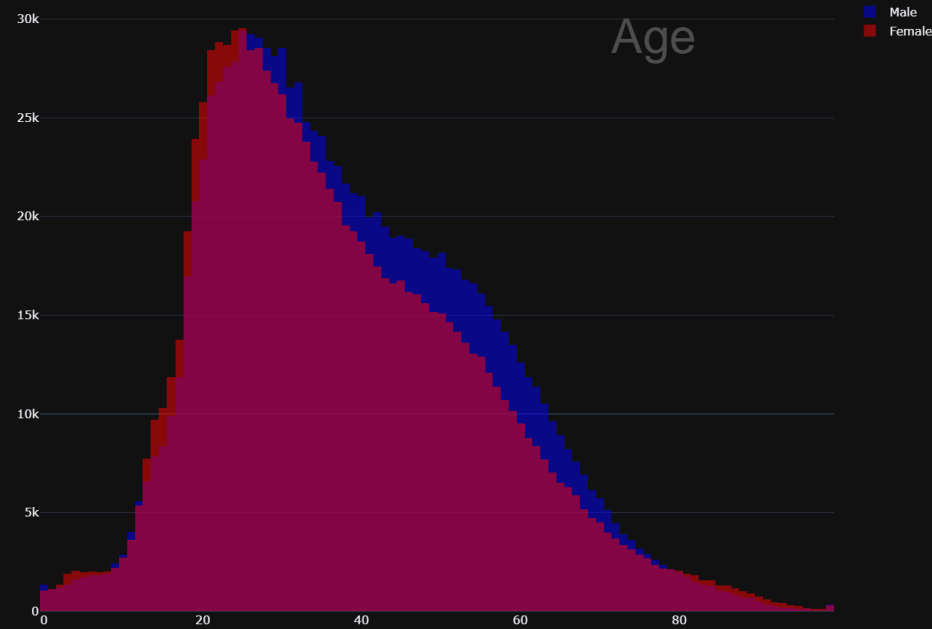
# Demographics of Offenders



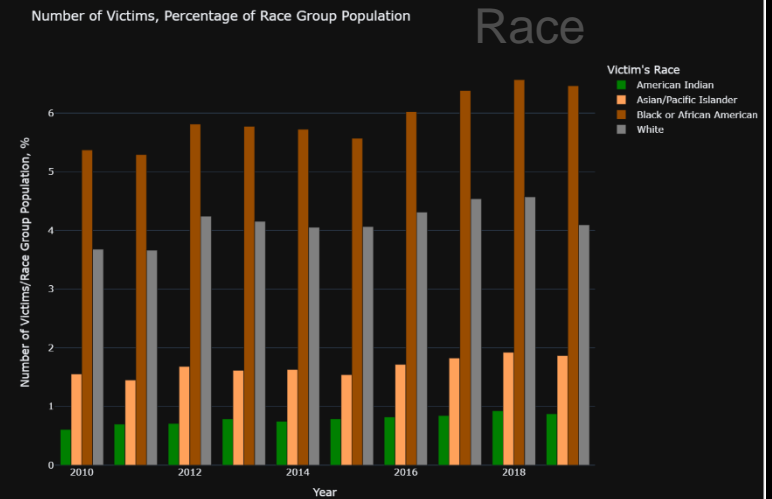
CRIME SCENE DO NOT

# Demographics of Victims

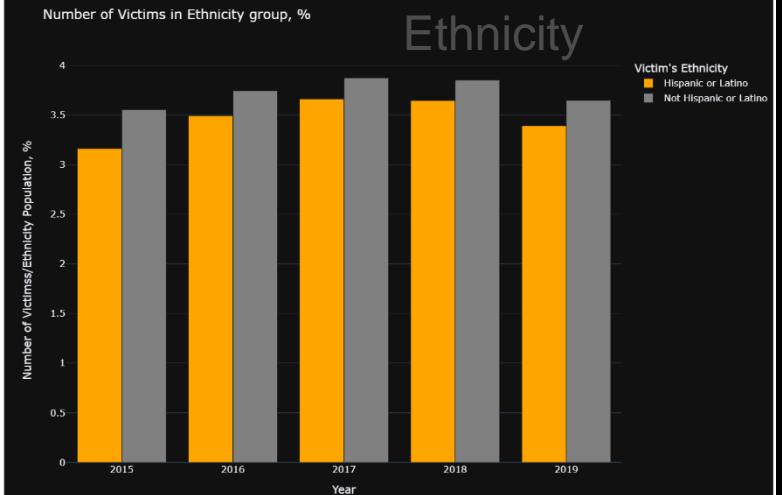
Age Distribution of Victims



Number of Victims, Percentage of Race Group Population



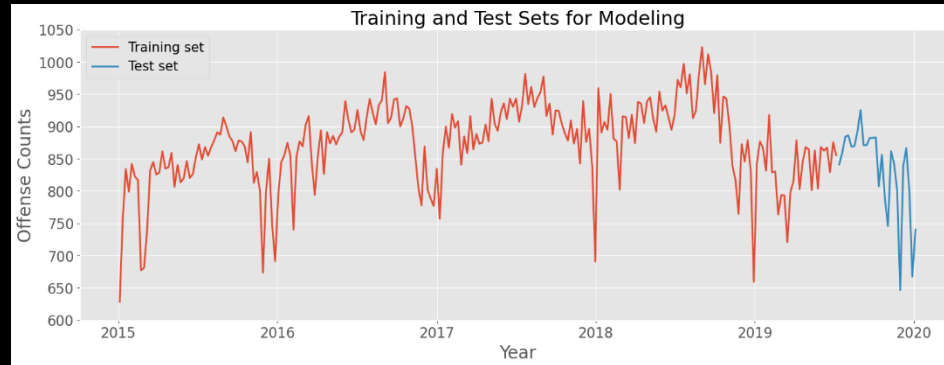
Number of Victims in Ethnicity group, %



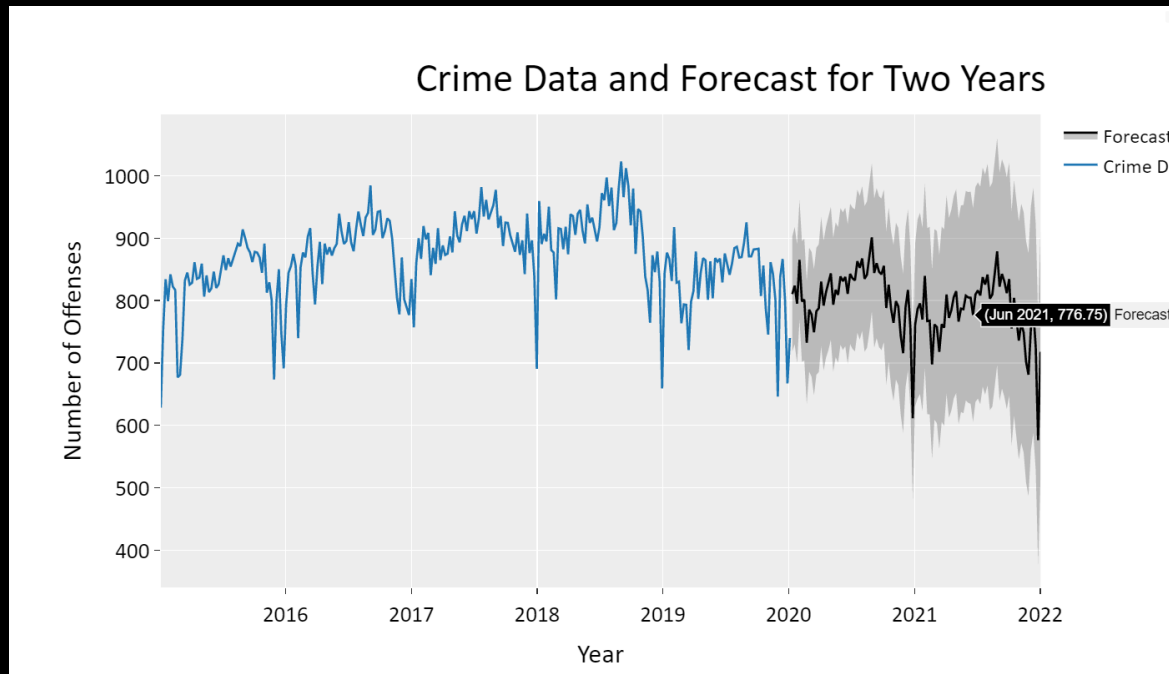
CRIME SCENE DO NOT

# Modeling General Crime

Real Data (2015-2019)



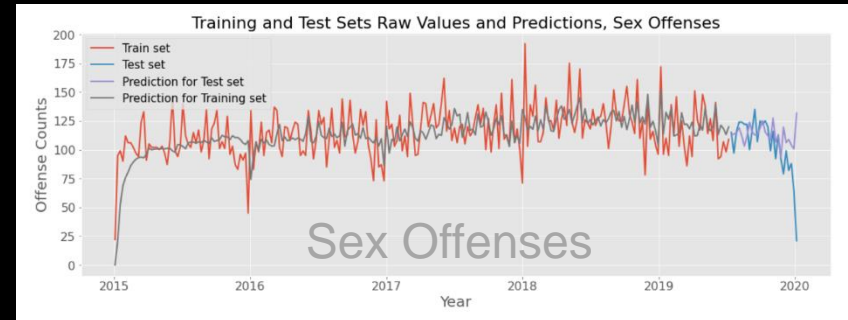
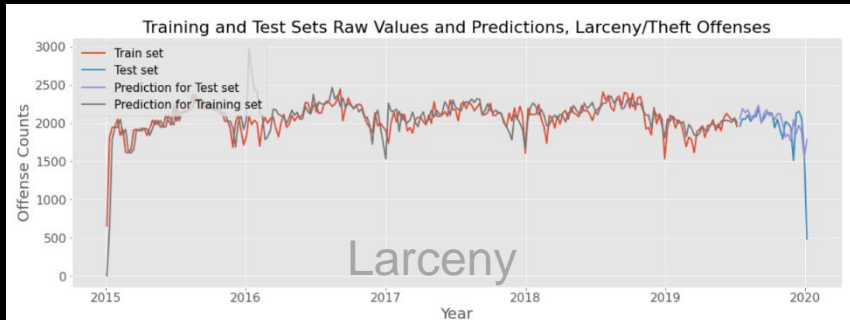
Forecasting Model (2021-2022)



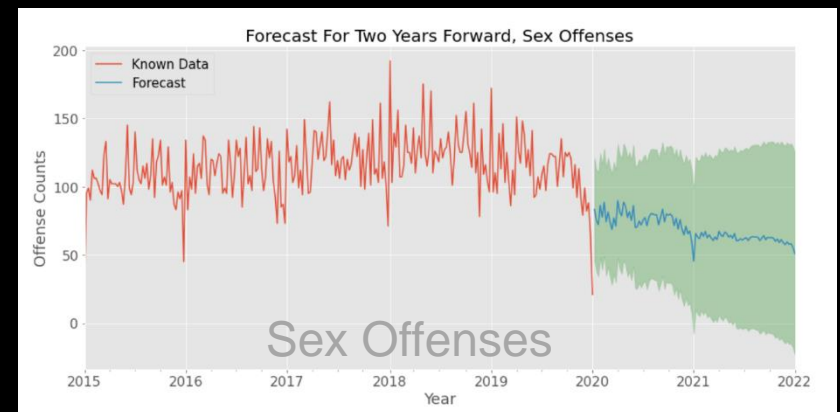
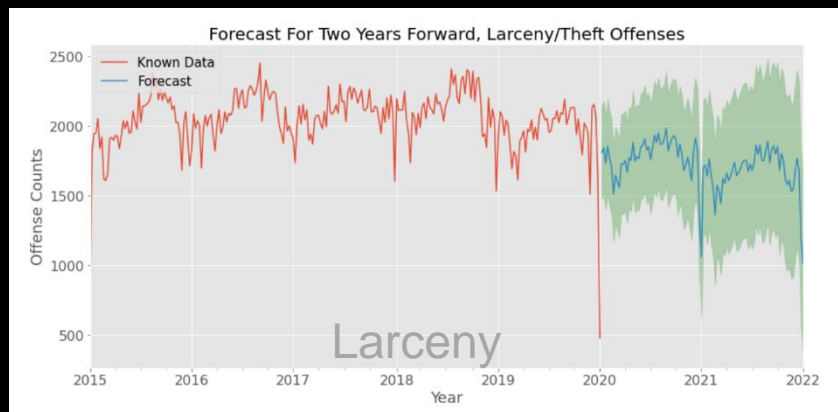
CRIME SCENE DO NOT

# Modeling Crime Categories

Real Data (2015-2019)



Forecasting Model (2021-2022)



# Conclusions

1. The project demonstrated that the actual crime data could be analyzed and modeled with significant accuracy
2. Generated models forecast general crime rates and categories crime rates
3. The Exploratory Data Analysis identified:
  - **Geographic areas with higher crime rates can help plan for law enforcement resources and preventive programs**
  - **Crimes' targets and weapons used**
  - **Offenders' and victims' demographics**
4. The dataset, results of EDA, and the models are the base for a web-based dashboard built with the dash python package

# Recommendations:

1. Obtain current data; isn't easy to forecast future trends with data almost two years old
2. Suppose dynamic data becomes available, build and an API. This approach would be the most helpful to the general public
3. Add exogenous predictors to the time-series to improve modeling performance. The most helpful predictors:
  - **Socio-economic features of the geographic areas**
  - **Additional offenders' and victims' demographics**
    - ✓ Income
    - ✓ Education
  - **Information about local crime prevention measures and policies**
4. Add geographic locations of committed offenses

CRIME SCENE DO NOT

# Thank You!

Email: [e.v.kazakova@gmail.com](mailto:e.v.kazakova@gmail.com)

GitHub: @sealaurel

LinkedIn: <https://www.linkedin.com/elena-v-kazakova/>