Would Your Murder Be Solved?

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Overview

WHO IS OUR TEAM?

Lindsay MacDonald

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WHAT IS THE TOPIC?

Influence of demographics on the homicide solve rate in California.

WHY THIS TOPIC?

Data Sources

U.S. Homicide Reports, 1980-2014

https://www.kaggle.com/jyzaguirre/us-homicide-reports

US Census Demographic Data

https://www.kaggle.com/muonneutrino/us-census-demographic-data/data?select=acs2015_county_data.csv

Questions to Answer

- Is there a correlation between the personal attributes of the victim and the solve rate?
- Is there a correlation between county demographics where the murder occurred and the solve rate?
- Can we develop a machine learning model that predicts whether or not a crime would be solved given hypothetical sets of circumstances?

Technologies Used

Data Exploration: Data Cleaning

Kaggle Dataset #1 (US Homicide Reports, 1980-2014)

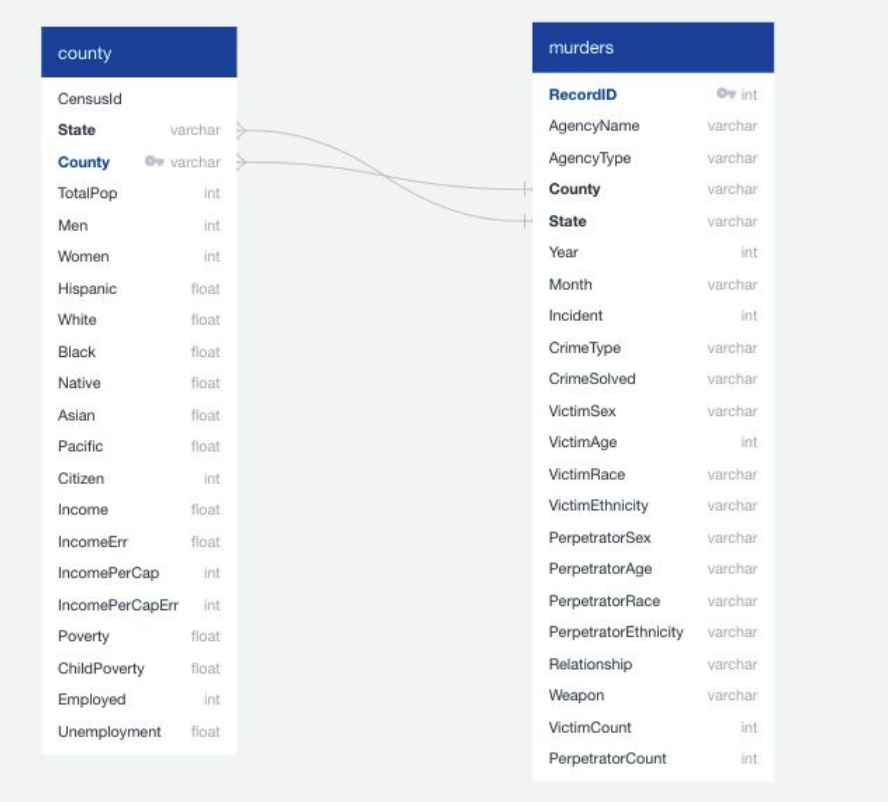
- Filtered ‘State’ column for California
- Renamed ‘City’ column as ‘County’ in order to merge with with the second dataset
- Dropped irrelevant columns
- Checked for null values (0)

Kaggle Dataset #2 (US Census Demographic Data)

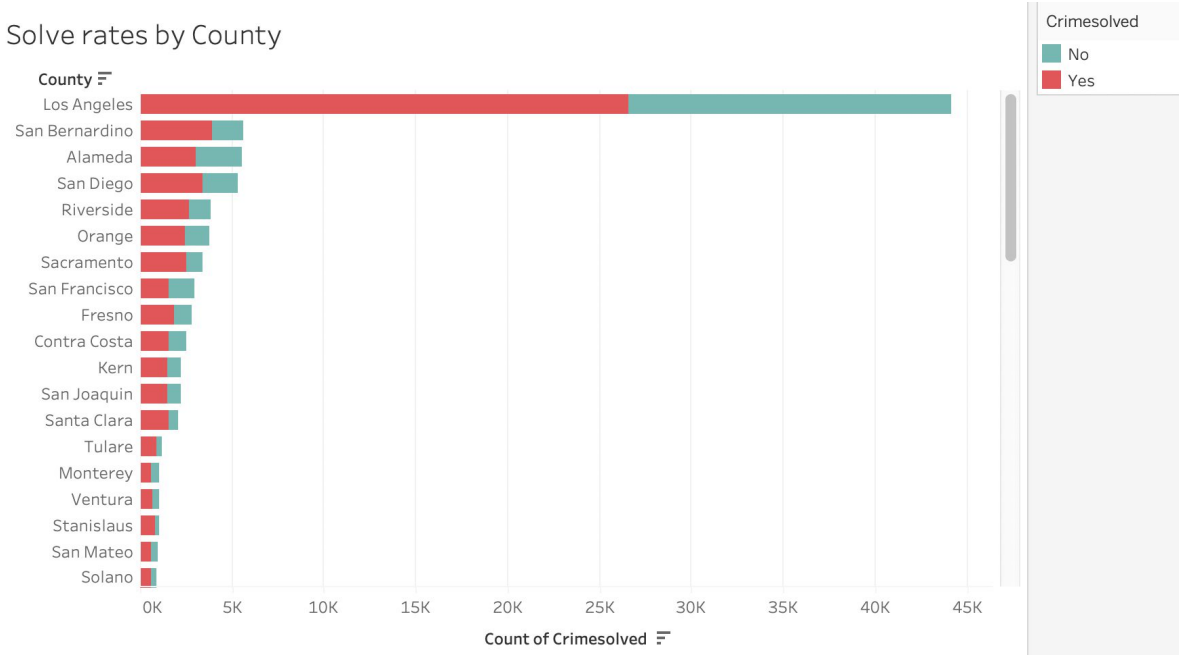
- Filtered ‘State’ column for California
- Dropped irrelevant columns
- Checked for null values (0)

Datasets were imported into Postgres and joined; merged dataset was then uploaded to AWS S3 bucket

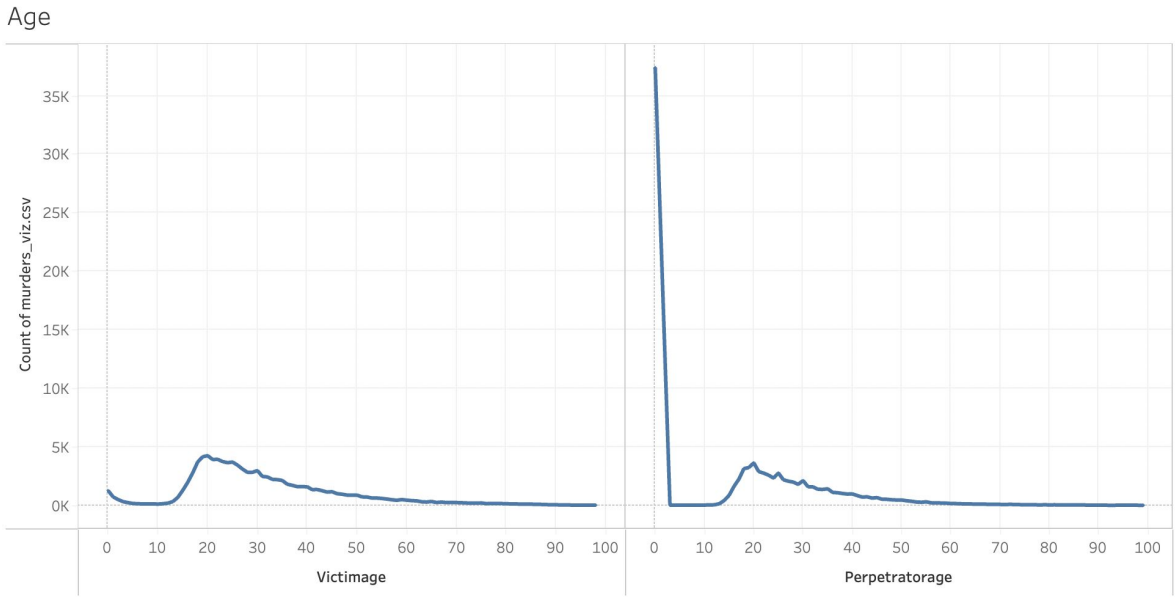
Database Structure



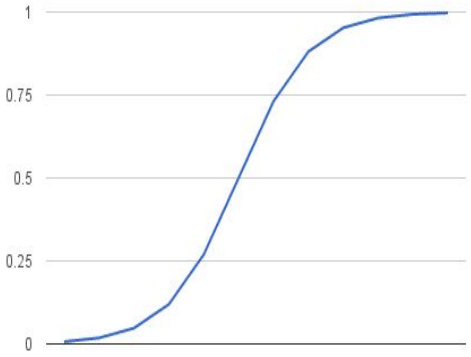
Data Exploration: Initial Findings

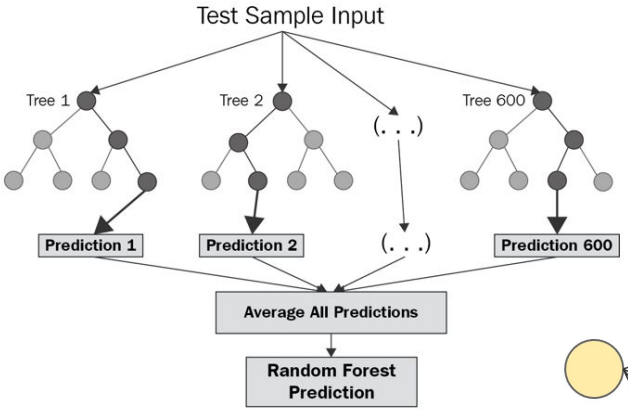


Data Exploration: Initial Findings



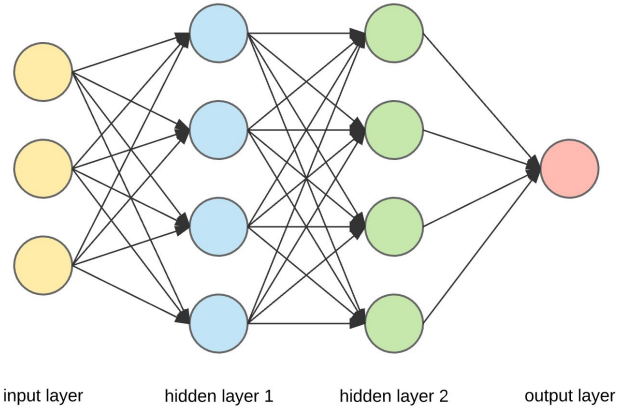
Analysis: Machine Learning





Model Selection:

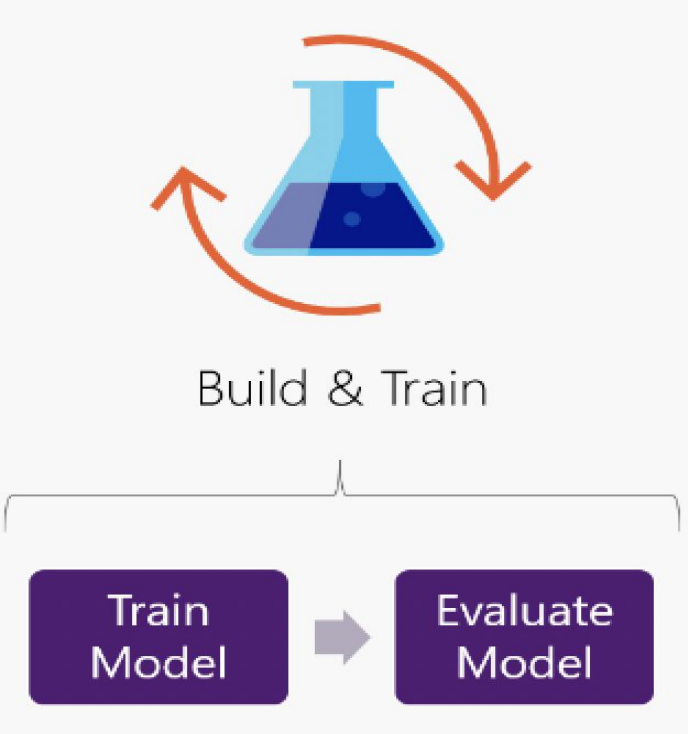
Pros and Cons



Analysis: Machine Learning

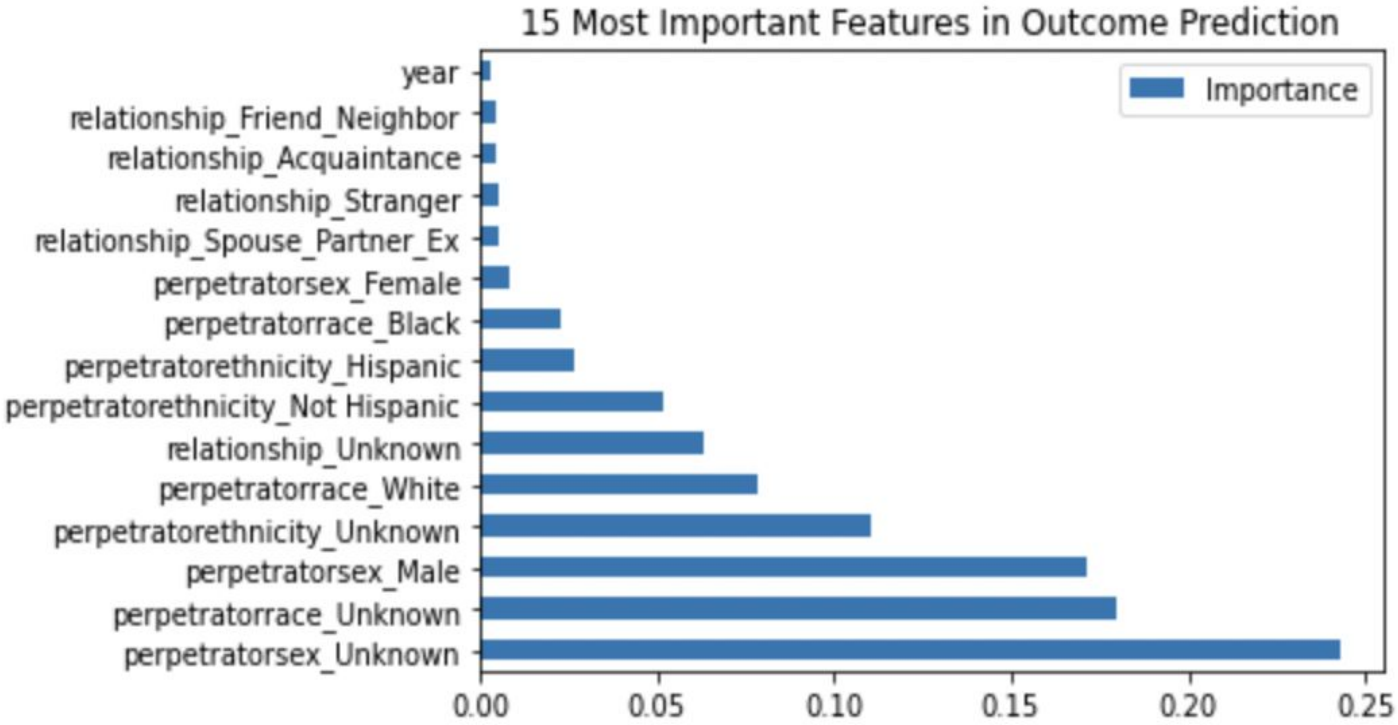
- Import data from AWS
- Preprocessing steps
- Feature Extraction
- Train_Test_Split() & StandardScaler()

Analysis: Machine Learning

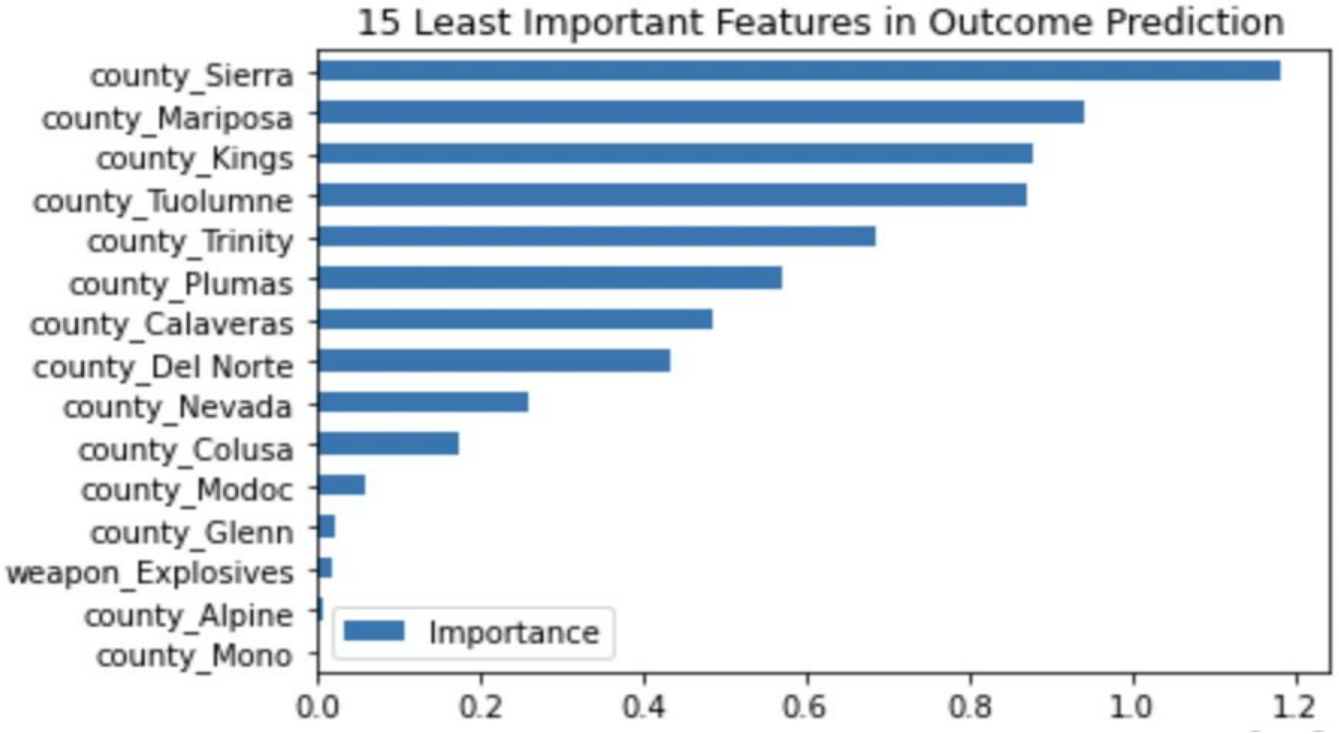


- Accuracy Scores
- Confusion Matrix Results
- Feature Ranking
- Rinse & Repeat

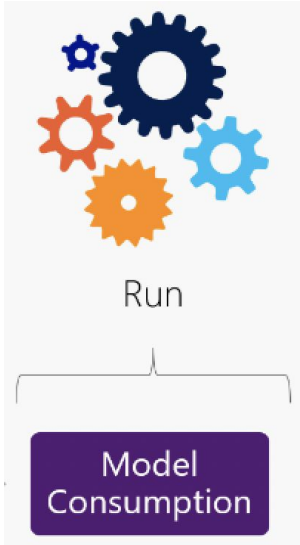
Analysis: Machine Learning



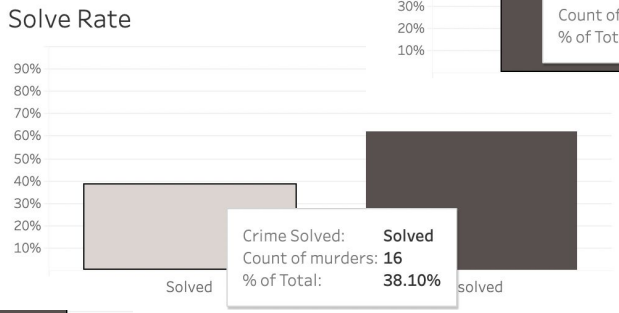
Analysis: Machine Learning



Analysis: Machine Learning



Predictions for hypothetical scenarios



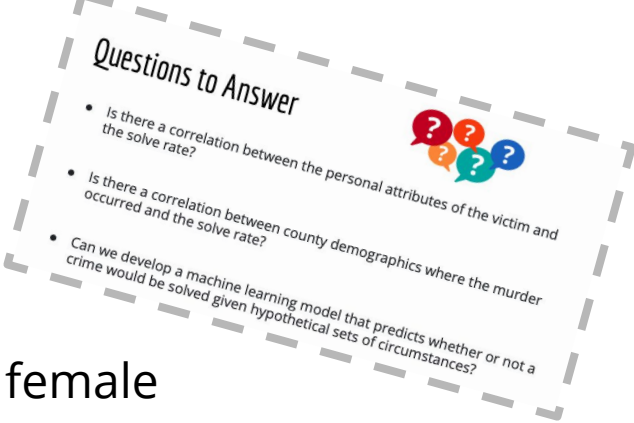

```
# Run the model on new data
new_reg_pred = regressor.predict(new_scaled_data)
new_reg_pred
```

```
array([0.99414333, 0.29538321, 0.99975    ])
```

Analysis: Dashboard

Link to Interactive Dashboard

Key Findings



- Crimes are solved more frequently when the victim is female
- The younger the victim, the more likely it is that the crime will be solved
- The crime is more likely to be solved when the victim is white
- Counties with higher rates of citizenship have a higher crime solve rate
- Counties that are predominantly white have a higher crime solve rate

Unexpected Results

- As regional income increased, solve rates decreased
- When normalized by per capita, homicide rates were much higher in Alpine County and much lower in San Diego than when compared to the raw numbers
- While the majority of perpetrators were male, the majority of victims were female

Recommendation for Future Analysis

- Interactivity for machine-learning portion of the analysis
- Tableau stories and filter table based on perpetrator demographics in addition to victim demographics
- Census data expanded to include the entire time frame present in the homicide data

Things We Would Have Done Differently

- More data exploration in the beginning
- Coordinated dashboard and machine learning earlier on