Analysis of Crime in Washington

(1990-2020)

Department of Applied Data Science San Jose State University

DATA 230: Data Visualization Professor: Andrew H. Bond May 17, 2022

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# Introduction

## Purpose of this Document

The purpose of this document is to provide a detailed project description of the analysis performed on Crime and Law Enforcement data, which is designed to understand relation of crime to law enforcement strength and population and provide statistics and trends about it through visualizations. This document includes details about organization, roles, deliverables, project risks, time plans and financial plans.

## Intended Audience

This document shall be used in all phases of the project as a guideline. Intended audiences of this project are all project stakeholders:

Professor Andrew Bond

TA Ritanjali Jena

Tirth S. Patel

## Scope

This document shows the project plan for the analysis of Crime, Law-Enforcement and population data using Tableau. The document includes the purpose of the project, organization plan for the project, data collection, and applications used. The data for the project includes information about the crime, law enforcement and population statistics collected and maintained by the US government, so the scope of data is limited to the United States and data is collected only for past 20 years i.e., 1990 - 2020.

## About The dataset

### Definitions

The dataset is combination of data from multiple sources and contains following fields:

* AGGRAVATED ASSAULT - An unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily injury. This type of assault usually is accompanied using a weapon or by means likely to produce death or great bodily harm.
* ARSON: The willful or malicious burning, or attempt to burn, with or without intent to defraud, a dwelling house, public building, motor vehicle or aircraft, personal property of another.
* BURGLARY: The unlawful entry, or attempted entry, of a structure to commit a felony or a theft.
* MURDER: The willful killing of one person by another or the killing of another person through gross negligence. Also includes the non-violent offense of Controlled Substance Homicide. Summary Reporting System Data Definitions Washington State Statistical Analysis Center 2 Updated on October 27, 2018
* MVTHEFT: The theft or attempted theft of a motor vehicle.
* POPULATION: The total population for the jurisdiction of the agency, as reported by the agency.
* PRATE: Number of property crimes per 1,000 residents.
* PTOTAL: Total number of property crimes reported including burglary, theft, motor vehicle theft, and arson.
* RAPE: The carnal knowledge of a female forcibly and against her will. Also includes attempts to commit forcible rape.
* RATE: Number of crimes committed per 1,000 residents.
* ROBBERY: The taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or the threat of force or violence and/or by putting the victim in fear.
* TOTAL: Total number of crimes reported by the law enforcement agency.
* VRATE: Number of violent crimes committed per 1,000 residents.
* VTOTAL: Total number of violent crimes reported including murder, rape, robbery, and aggravated assault.
* ANIMAL\_CRUELTY: Intentionally, knowingly or recklessly taking an action that mistreats or kills any animal without just cause. Included are instances of failure of duty to provide care (food, water, shelter, vet); transporting/confining an animal in a way likely to cause injury/death; causing an animal to fight with another; inflicting excessive or repeated pain/suffering.
* ARSON: To unlawfully and intentionally damage or attempt to damage any real or personal property by fire or incendiary device.
* ASSAULT: Includes the following offenses:
  + Aggravated Assault: An attack wherein the offender uses a weapon or displays it threateningly or the victim suffers obvious severe bodily injury and attempts to murder.
  + Simple Assault: A physical attack where no weapon is displayed, and the victim does not suffer any obvious or suspected severe injury such as those in aggravated assaults.
  + Intimidation: To place another person in reasonable fear of bodily harm using threatening words and/or other conduct but without displaying a weapon or subjecting the victim to actual attack. Includes stalking.
* BRIBERY: The offering, giving, receiving, or soliciting of anything of value to sway the judgment or action of a person in a position of trust or influence.
* BURGLARY: The unlawful entry into a building or other structure with the intent to commit a felony or theft.
* COUNTERFEITING\_FORGERY: The altering, copying or imitation of something, without authority or right, and passing, selling, buying, or possessing with the intent to deceive or defraud.
* DESTRUCTION\_OF\_PROPERTY: To destroy willfully or maliciously, damage, deface or otherwise injure real or personal property without the consent of the owner or person having custody.
* DRUG\_VIOLATIONS: Includes the following offenses:
  + Drug/Narcotic Violations: The unlawful cultivation, manufacture, distribution, sale, purchase, use, possession, transportation or importation of any controlled drug or narcotic substance. Excludes DUIs.
  + Drug Equipment Violations: The unlawful manufacture, sale, purchase, possession or transportation of equipment or devices utilized in preparing and/or using drugs or narcotics.
* EXTORTION\_BLACKMAIL: To unlawfully obtain money, property or any other thing of value through the use of threat of force, misuse of authority, threat of criminal prosecution, threat of destruction of reputation or through other coercive means.
* FORCIBLE\_SEX: Includes the following offenses:
  + Forcible Rape: The carnal knowledge of a person, forcibly and/or against that person’s will.
  + Forcible Sodomy: Oral or anal sexual intercourse with another person, forcibly and/or against that person’s will.
  + Sexual Assault with an Object: To use an object to unlawfully penetrate the genital or anal opening of the body of another person, forcible and/or against that person’s will.
  + Forcible Fondling: The touching of the private body parts of another person for the purpose of sexual gratification, forcibly and/or against that person’s will.
* GAMBLING\_VIOLATIONS: Includes offenses for Betting/Wagering, Operating/ Promoting/Assisting Gambling, Gambling Equipment Violations and Sports Tampering.
* HUMAN\_TRAFFICKING: Includes the following offenses:
  + Commercial Sex Acts – Inducing a person by force, fraud, or coercion to participate in commercial sex acts or in which the person induced to perform such acts has not attained 18 years of age.
  + Involuntary Servitude – Obtaining of a person through recruitment, harboring, transportation, or provision and subjecting such person by force, fraud or coercion into involuntary servitude, peonage, debt bondage or slavery (not to include commercial sex acts).
* KIDNAPPING\_ABDUCTION: Unlawful seizure, transportation and/or detention of a person against his/her will or of a minor without the consent of his/her custodial guardian. Includes hostage-taking.
* MANSLAUGHTER: Negligent Manslaughter is the killing of another person through negligence. Excludes Vehicular Manslaughter.
* MURDER: The willful killing of one person by another or the killing of another person. Includes Nonnegligent Manslaughter. Note: attempted murders are reported as Aggravated Assaults.
* NON\_FORCIBLE\_SEX: Includes the following offenses:
  + Incest: Non-forcible sexual intercourse between persons who are related to each other within the degree where in marriage is prohibited by law.
  + Statutory Rape: Non-forcible sexual intercourse with a person who is under the statutory age of consent.
* POPULATION: The total population for the jurisdiction of the agency, as reported by the agency.
* PORNOGRAPHY: The violation of laws or ordinances prohibiting the manufacture, publishing, sale, purchase, or possession of sexually explicit material.
* PROSTITUTION: Includes the following offenses:
  + Prostitution: To unlawfully engage in or promote sexual activities for profit.
  + Assisting or Promoting Prostitution: To solicit customers or transport persons for prostitution purposes; to own, manage or operate an establishment for the purpose of providing a place where prostitution is performed; to otherwise assist or promote prostitution.
  + Purchasing Prostitution: To purchase or trade anything of value for commercial sex acts.
* PRPRTYRATE: Number of property offenses reported per 1,000 residents.
* PRPRTYTOTAL: Total number of property offenses reported including arson, bribery, burglary, counterfeiting and forgery, destruction of property, extortion/blackmail, robbery, and theft.
* PRSNRATE: Number of person offenses reported per 1,000 residents.
* PRSNTOTAL: Total number of person offenses reported including murder, manslaughter, forcible sex, assault, intimidation, non-forcible sex, kidnapping/abduction, violation of a no-contact order and human trafficking.
* RATE: Number of offenses committed per 1,000 residents.
* ROBBERY: The taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or the threat of force or violence and/or by putting the victim in fear.
* SCTYRATE: Number of society crimes per 1,000 residents.
* SCTYTOTAL: Total number of society offenses reported including drug violations, gambling violations, pornography/prostitution, weapon law violations, and animal cruelty.
* THEFT: Includes the following offenses:
  + Embezzlement: The unlawful misappropriation by an offender to his/her own use or purpose of money, property or some other thing of value entrusted to his/her care, custody, or control.
  + Fraud: The intentional perversion of the truth for the purpose of inducing another person or entity in reliance upon it to part with something of value or surrender a legal right. Includes offenses for False Pretense/Swindle/Confidence Game, Credit Card/ATM Machine Fraud, Impersonation, Welfare Fraud and Wire Fraud.
  + Larceny: Includes offenses for Pocket-picking, Purse-snatching, Shoplifting, Theft From a Building, Theft From Coin-Operated Machine or Device, Theft From Motor Vehicle, Theft of Motor Vehicle Parts or Accessories, All Other Thefts.
  + Motor Vehicle Theft: The theft of a motor vehicle as defined as a self-propelled vehicle that runs on the surface of land and not on rails.
  + Stolen Property Offenses: Receiving, buying, selling, possessing, concealing, or transporting any property with the knowledge that it has been unlawfully taken.
* TOTAL: Total number of offenses reported by the law enforcement agency.
* VIOL\_OF\_NO\_CONTACT: All violations of court ordered no-contact, protection, restraining or antiharassment orders. May not be domestic violence related.
* WEAPON\_LAW\_VIOLATIONS: The violation of laws prohibiting the manufacture, sale, purchase, transportation, possession, concealment or use of firearms, cutting instruments, explosives, incendiary devices or other deadly weapons.

# Background and Objectives

A wrong against society established by law is a common definition of crime. United States government has placed the responsibility to overwatch the offenders and law breakers in the hands of responsible agencies and organizations. The government has also established bodies to maintain and secure these records of crime, population, and law enforcement agency related information to maintain a history for analysis and statistics. The objective of this project is to analyze pattern and trend of crimes reported, and arrests and sentences that occurred between the year 1990 and 2020.

# Architecture and High-level design

**Diagram

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The data for the project come from two different sources

1. Washington State Statistical Analysis Center - it is an official government website which is updated annually with new data
2. Washington Association of Sheriffs and Police Chiefs - it is an official government website which is updated annually with new data

After the data from both the sources, all the data was added to tableau prep builder to clean and transform the data. The clean data was then merged and then exported into CSV format for the visualization.

Finally, the cleaned and transformed/merged data was imported into Tableau for the data analysis and visualization of the data

# Organization

## Project group

It is an individual work done by Tirth S. Patel (015949752), San Jose State University.

# Development Process

The process for the project starts from collecting the data. For analysis we needed historical crime statistical data. For this purpose, the data was collected from the Washington State Statistical Analysis Center which contained all the data from the government database about the crime stats which happened over the past number of years while the law enforcement stats data was made available by Washington Association of Sheriffs and Police Chiefs for the past number of years.

Once the data was collected the individual csv files were imported to Tableau Prep Builder. It is a product developed and distributed by Tableau which helps to clean and process the data by the means of GUI.

For each of the files, data types for the columns were set according to the data it contained such as changing data type for city column from string to geographical location and many more.

Many rows were removed because it contained multiple null values which made the whole row meaningless. Also certain calculated columns were introduced to help categorize rows based on certain values for analysis. Many columns were also removed as not all the data provided by these data sources were required for the analysis.

Funnel chart

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Also, to make the data uniform, certain categorical values were changed from to match values from different data sources.

A screenshot of a computer

Description automatically generated with medium confidence

Once the data was cleaned and merged it was time to perform analysis and create visualizations in Tableau. The figure below shows the sample of data imported in tableau ready for visualization.Graphical user interface, application

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Graphical user interface

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# Deliverables

The most important deliverable of this project is to provide 2 important dashboards for overall distributed analysis. A project presentation is also given. And the Final Project report will be submitted. All the data processing and visualization codes are to be delivered.

# GitHub

<https://github.com/geeky-T/DATA-230-DataVisualization-Washington-Crime-Analysis>

# Charts

## Average Crimes by category in each county

### Arrested

A map of the world

Description automatically generated with medium confidence

### Reported

Map

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### Sentenced

A map of the world

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## Average Law Enforcement Strength per county

A screenshot of a map

Description automatically generated with medium confidence

## Change in Law Enforcement strength over time

Chart

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## Change in Law Enforcement Strength and Crime

Chart, line chart, histogram

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## Change in Law-enforcement affect to crime

Chart

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## Crime Summary per county

Chart, shape, treemap chart

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## Change in Categorized Crime over period

Chart, line chart

Description automatically generated

## Summary of Categorized Crime over the period

Graphical user interface, website

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# Dashboards

## Washington Crime Dashboard

Graphical user interface

Description automatically generated

## Washington Law Enforcement Dashboard

Graphical user interface

Description automatically generated

# References

Washington Association of Sheriffs and Police Chiefs - <https://sac.ofm.wa.gov/data>

Washington State Statistical Analysis Center - <https://www.waspc.org/cjis-statistics---reports>