

# FINAL PROJECT REPORT

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## Police Fatality in the United States of America

CSE 564 : Visualization

## Background

In the [United States](#), **use of deadly force by police** has been a high-profile and contentious issue. In 2019, 1,004 people were shot and killed by police according to *The Washington Post*, whereas the "Mapping Police Violence" project counted 1,098 killed. The overwhelming majority of these police homicides are fatal shootings.

In recent years, particularly since the fatal shooting of Michael Brown in Ferguson, Missouri in 2014, police brutality has become a hot button issue in the United States. The USA has very high rates of homicide by police compared to other high-income countries, such as England where the number is significantly lower.

The Black Lives Matter Movement, formed in 2013, has been a vocal part of the movement against police brutality in the U.S. by organizing "die-ins", marches, and demonstrations [in response to the killings of black men and women by police](#). Recently, **Breonna Taylor**, a 26-year-old African-American woman, was fatally shot in her [Louisville, Kentucky](#), apartment on March 13, 2020, this has stirred up more riots than ever making it a well-known pressing issue worldwide.

## Problem

We aim to provide some insights into the patterns of police violence across the country through different visualizations.

Following are the questions for which we aimed to provide resolution using the visual analytics tools & concepts which we learned from CSE564 Visualization class:-

1. Are there certain areas that experience more police killings than others? Are they linked to the violent crime rate in those areas?
2. Is there any major dependence on the race of the person killed?
3. Are there certain types of initial encounter with the victim which caused more police fatalities? Could they have been averted?
4. Could these killings be avoided? If so, how many would they be?
5. Which category of geography i.e., urban, suburban or rural had the most killings?

# Data

Dataset link :

<https://docs.google.com/spreadsheets/d/1s3Lj1cXDSgGGNnkQgnFvRhpqICVsJYV85rM9FPEkg0/edit?usp=sharing>

Since Jan. 1, 2015, The Washington Post has been compiling a database of every fatal shooting in the US by a police officer in the line of duty.

It's difficult to find reliable data from before this period, as police killings haven't been comprehensively documented, and the statistics on police brutality are much less available. As a result, a vast number of cases go unreported.

The Washington Post is tracking more than a dozen details about each killing - including the race, age and gender of the deceased, whether the person was armed, and whether the victim was experiencing a mental-health crisis. They have gathered this information from law enforcement websites, local news reports, social media, and by monitoring independent databases such as "Killed by police" and "Fatal Encounters". The Post has also conducted additional reporting in many cases.

## Dataset Description :

The attributes are US census data on EncounterType, Violent crime rate,Avg Annual Police Homicide rate, Date of Incident,Manner of death,armed and Racial demographics.

- We have cleaned the dataset and are planning to use 3 numerical attributes and 8 categorical attributes in total for the project.

The attributes that we have chosen are as follows:

Attribute	Type	Brief Description
Victim_age	Numerical	Age of the victim
Violent_crime_rate	Numerical	Average number of crimes per city
Avg_Annual_Police_Homicide_rate	Numerical	Average number of killings by police per city
Date_of_Incident	Categorical	Date of the killing
Victim_race	Categorical	Race of the victim.

Geography	Categorical	State where the fatality occurred.
City	Categorical	Name of the city where the fatality occurred.
manner_of_death	Categorical	If the victim was shot or shot and tasered.
Armed	Categorical	Type of weapon possessed by the police during the incident.
gender	Categorical	Gender of the victim.
Encounter_Type	Categorical	The reason used by police to initially approach the victim.

## Approach

We aim to visualize the data using the following graphs:

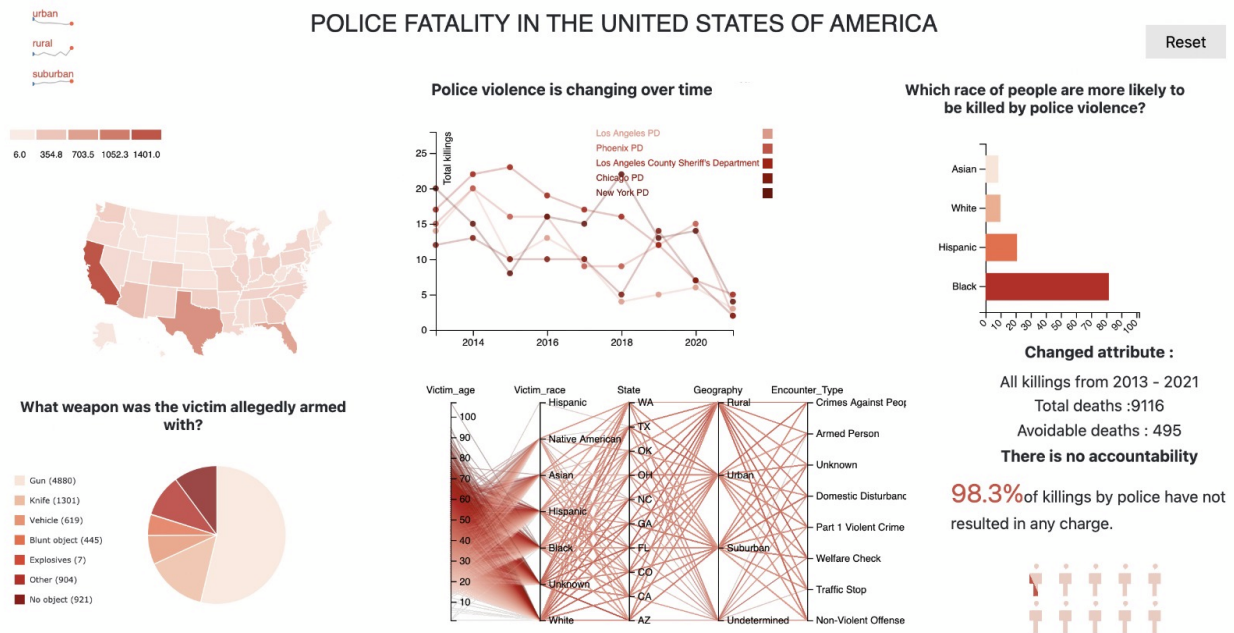
- A pie chart showing the percentage of killings based on geography - suburban,urban and rural.
- A choropleth of all the states with legend based on police fatality count.
- A multi-line chart showing number of killings by race and for each year
- A bar chart showing the number of killings statewide.
- A parallel coordinate plot showing the relationship between Age, Race, State, Geography and different types of initial encounters with police which ended in fatal shootings.
- Statistics showing number of killings, number of killings that could have been avoided and state.

All the above plots will be interactive, and based on the selection, corresponding data will get populated in the remaining graphs.

## Technology Stack

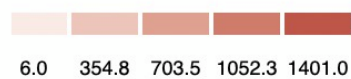
1. Python - For cleaning and preprocessing the data
2. Flask - For data movement between backend and frontend
3. Bootstrap, HTML, CSS - For displaying the frontend framework
4. D3.js - For creating and plotting the graphs

# Dashboard

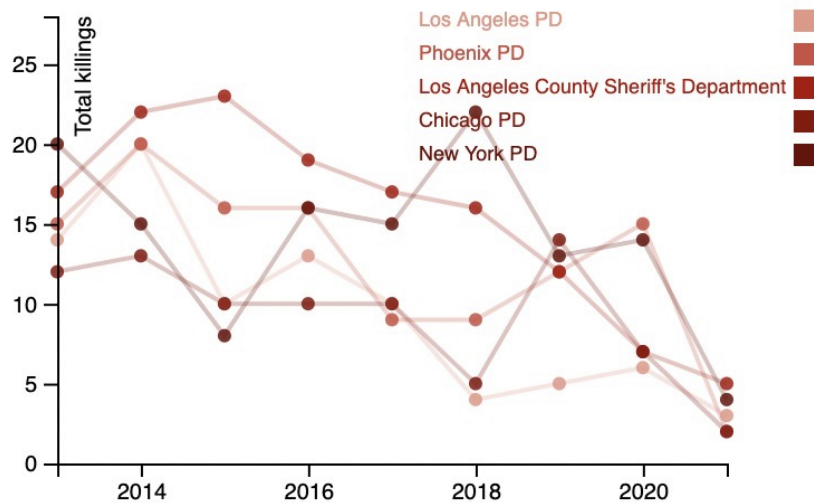


## Components:

→ A choropleth showing the total number of killings per state.

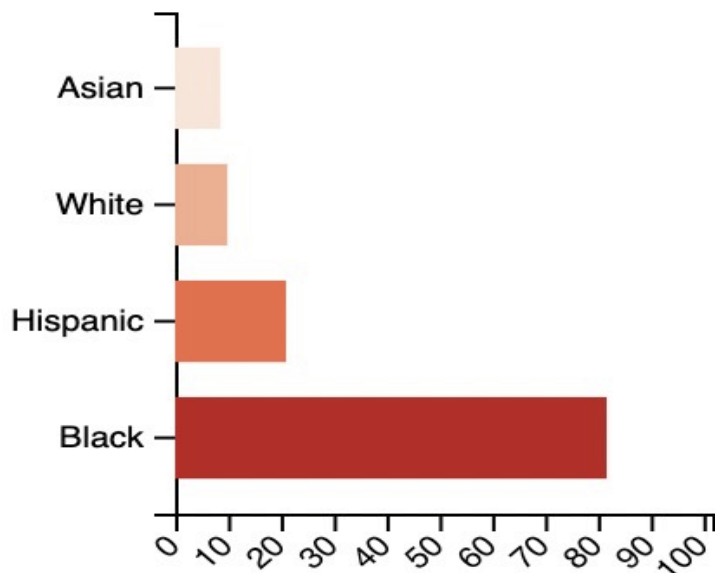


→ A multi-line chart showing a time series analysis of the number of killings by Police Departments.

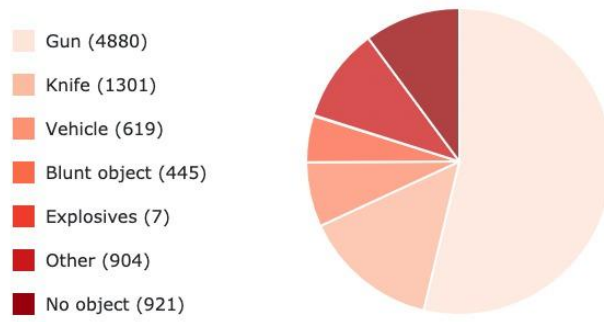


→ A bar chart showing the race of the people killed.

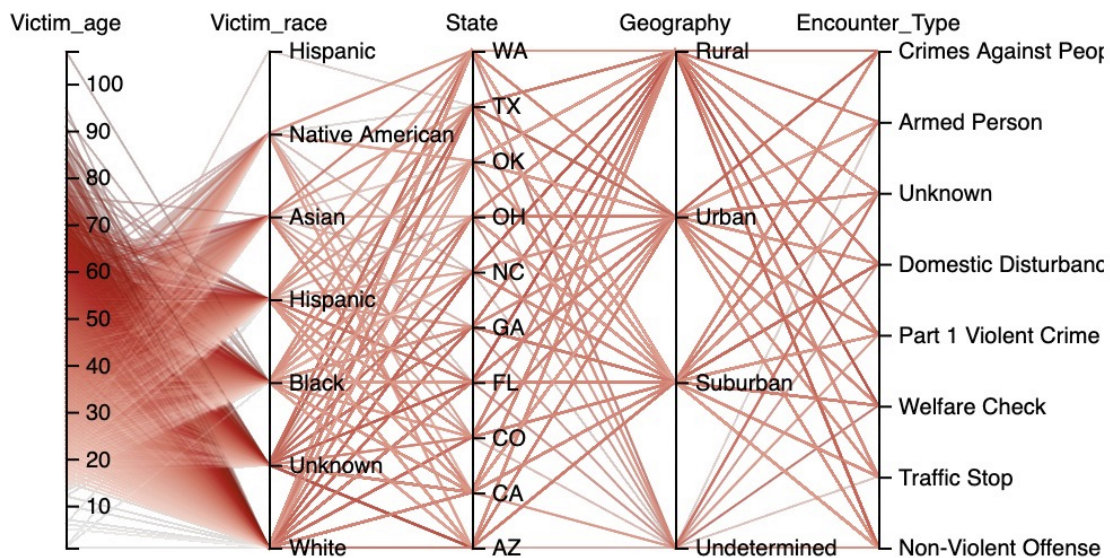
This has been population-scaled ( total killings of that race / population of race in state \* total population of state) to show the disparity of killings accurately.



→ A pie chart showing the weapon the victim was allegedly armed with during the first encounter with the police.

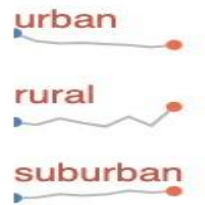


→ A parallel coordinate plot showing the relationship between Age, Race, State, Geography and different types of initial encounters with police which ended in fatal shootings.





→ Sparklines to show the trend of killings from 2013 - 2020 based on the geography.



→ Statistics showing the total number of killings, the deaths that could have been avoided, and the attribute based on which it is filtered.

### Changed attribute :

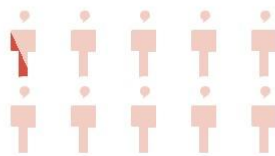
All killings from 2013 - 2021

Total deaths :9116

Avoidable deaths : 495

→ A pictogram depicting the killings which did not result in any conviction.

**98.3%** of killings by police have not resulted in any charge.



→ A reset button to remove the filters and show the dashboard for entire US statistics.



## Interactions :

Component	Interaction element	Result
Choropleth	Click on any state	Filters the dashboard by that state's statistics
Bar chart	Click on any race	Filters the dashboard by that race's statistics
Pie chart	Click on any weapon	Filters the dashboard by that weapon's statistics
Parallel Coordinates Plot	Brushing	Filters the selected portion's statistics

## Interesting Insights :

- When scaled by population of race, black people are 8x more likely to be killed than white people.
- 5% of deaths were of people who called for mental health/welfare checks. These could've been avoided if mental health specialists had responded instead of cops.
- ~50% of the victims were allegedly wielding a gun.
- There is a decrease in the number of killings being done in urban areas, but there is an increasing trend over time in rural areas.