

INFO 247 Final Project Report

Factors Affecting Actions of Law Enforcement

Team Members: Abhishek Sinha, Mudit Kakkar, Sandeep Pal

1. Project Title

Exploring factors which affect the actions of law enforcement

2. Names of students who worked on the project

Abhishek Sinha, Mudit Kakkar, Sandeep Pal

3. Project goals, including what kinds of tasks the interface containing the visualization is targeted towards.

With this project, we aim to start a conversation about civilians who have been killed by the police over the past 5 years in the United States. Innocent civilians being shot by the police is something that makes for big headlines and bigger protests. In such an environment, we felt that people generally remember what they heard or read most recently—recency bias—and that tends to crystallize over time, often leading people to believe that the police target some races over others. With our visualization, we wanted to present an objective view of what police killings have looked like over the past few years.

As the title suggests, we want to try and explore what factors affect the actions of law enforcement. By actions, we are referring to incidents in which people across different states in the US were killed by the police. These people differed in various aspects like gender, age and racial groups. Other aspects were:

- Some people were killed in incidents in which the police officers involved, did not have a body camera on them
- Some people tried to flee while others did not
- Some were mentally unfit
- Some people had a 'weapon' on them during the incident

Based on data analysis and exploration of the aspects mentioned above, we wanted to visualize the police killings. We do not intend to take the side of anyone since we do not have all the necessary information pertaining to these incidents, like the accounts of the police officers involved. Our primary objective is to show the information through our website and leave it to the viewer to decide if there are any factors that may seem to influence the actions of the law enforcement.

Our website interface consists of:

- Dynamic Dashboard- This dashboard shows data points which change on the click of buttons and on scrolling in a certain part of the website. These elements

create a timeline view of the various incidents in which people were killed by the police in the state of California from January 2015 to March 2018. Through the buttons and the scrolling action, the viewer can see details of the people killed across 3 facets- Whether body camera was on or not, whether the person was mentally ill or not and whether the person was fleeing from the police during the incident.

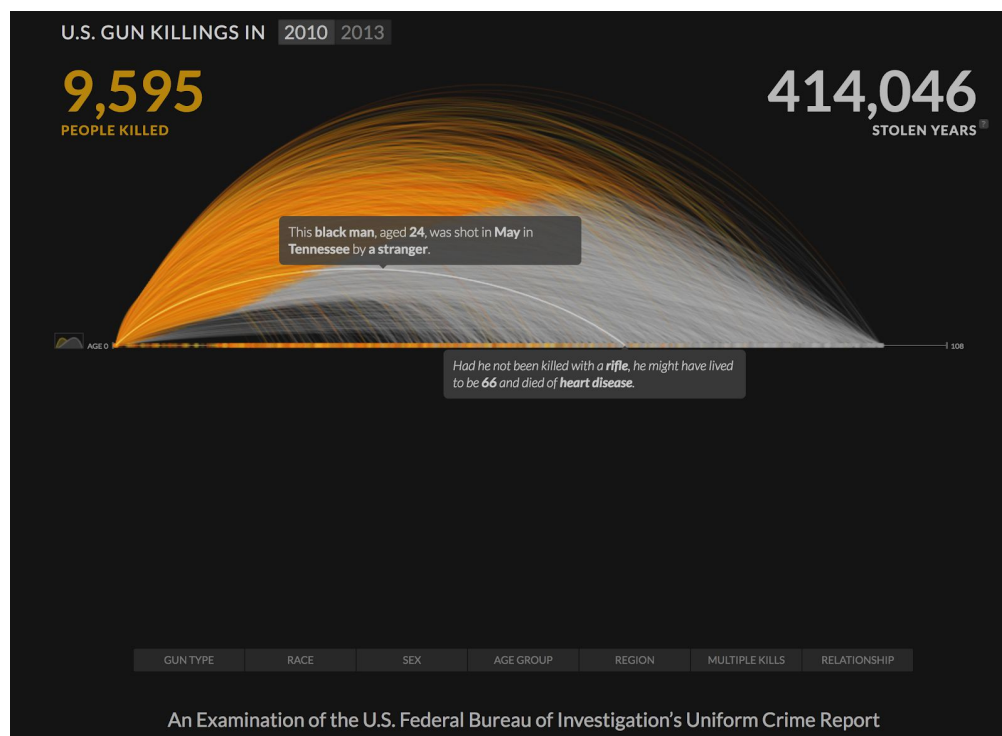
- Static Dashboards- These dashboards show the viewer the bigger picture about police killings all across the United States. These dashboards have tooltips which enable the viewer to hover over the visualization to find more information. These dashboards show the police killings using facets like the race of the person killed and whether or not the person was fleeing.
- Infographic- The narrative infographic intends to show the police killings in the 5 most populated states in the US. These states have witnessed the most number of crimes as compared to other states and also have a lot of diversity in terms of racial groups. Since we wanted to show specific figures to the viewer for these 5 states, we chose an infographic which shows the percentage of cases in which body cameras were off and the number people who were fleeing from the police. These numbers have been represented for 3 years to show a comparison on an yearly-basis to the viewer.

Some of the tasks that the interface was targeted towards were:

1. To inform the opinions of our viewers, we considered and presented factors such as an easy-to-understand comparison of the number of people killed across three major race groups—white, hispanic and black.
 2. To ensure that our viewers aren't swayed by geographic affiliations, we tried to present a narrative that begins with one incident in one state and grows into multiple incidents across multiple states before finally talking about all of the United States.
 3. With regards to the user experience of our website, we included a navigation bar at the bottom so the user can easily jump to whichever section they like. The website is also responsive and easily scales so it can viewed on a tablet or a phone
- 4. Discussion of related work - You must discuss at least 3 pieces of related work for each student on the project. You must say how your project relates to these readings or projects, and provide an image or sufficient description of the related work for the reader to understand how it is related.**

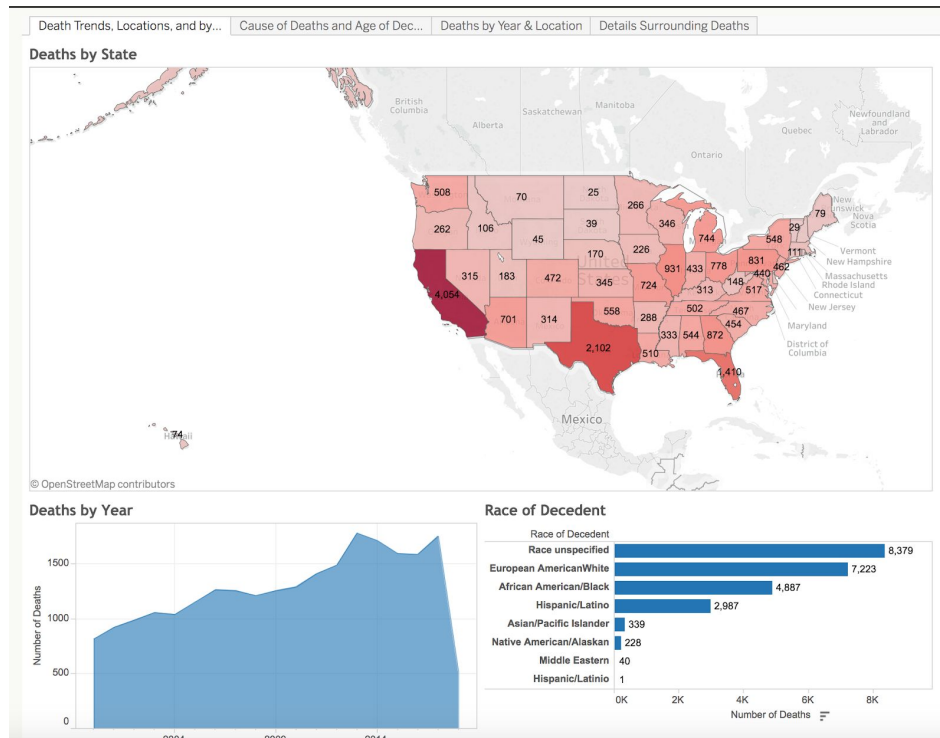
Below is a summary of the related work that we had referred to during the ideation phase of this project:

- U.S Gun Deaths (<https://guns.periscopic.com/>) - This is a visualization that Abhishek had presented in class as part of the interesting visualizations presentation. This visualization conveys very serious information in a very unique manner. Since this visualization conveys information that is very similar to the information we have visualized through our website, we considered using a similar approach for our website. This visualization was certainly quite challenging and we felt we could convey this information in a different manner that would entail using what we have learnt in this course.



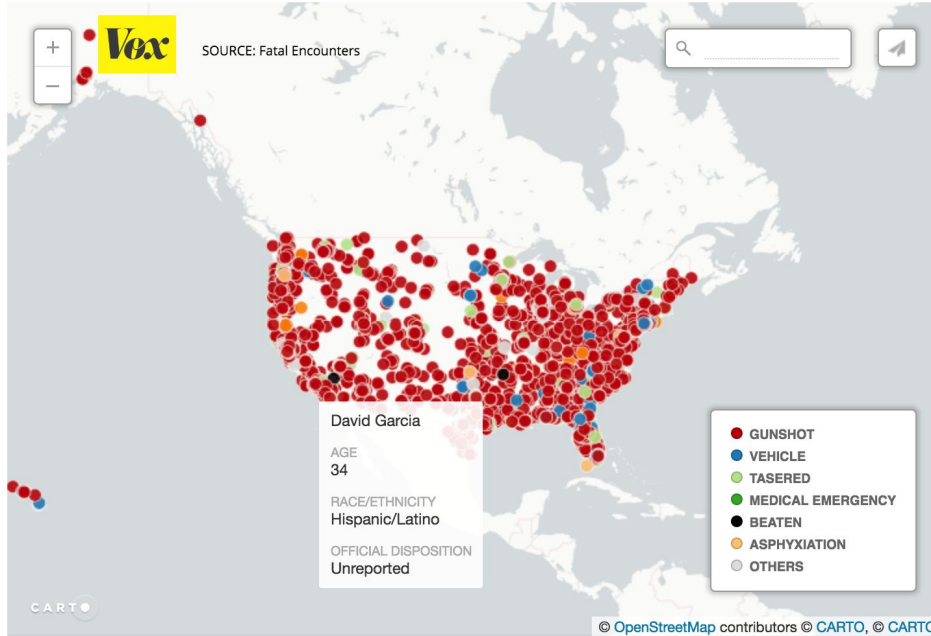
- Fatal Encounters (<http://www.fatalencounters.org/visualizations>) - This was one of the many websites we came across that focused on visualization of data pertaining to law enforcement accountability. This website was created by a D. Brian Burghart, a journalist who wrote that this website is “a step toward creating an impartial, comprehensive, and searchable national database of people killed during interactions with law enforcement.” Some of the visualizations on this website seemed quite relevant to us like the choropleth which shows the number

of killings in every state. We used a variation of this to show a year-wise comparison across different states from 2015 to 2017.



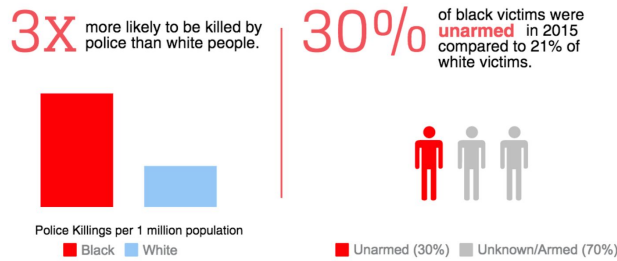
- **Interactive Map**

(<https://www.vox.com/2014/12/17/7408455/police-shootings-map>) - This website uses data from 'Fatal Encounters' (mentioned above) but presents police killings using an interactive map. Since we wanted to show police killings across various facets for multiple years, we felt that a variation of this map could be an option

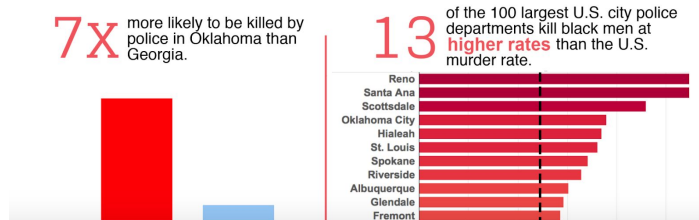


- Mapping Police Violence (<https://mappingpoliceviolence.org/>) - This was one the websites which focused its visualizations on police accountability. We really liked the infographics on this website and decided to use similar bar charts and isotypes for our own narrative infographic. But instead of focusing only on gender, we covered other facets as well for a more holistic view.

Black people are most likely to be killed by police



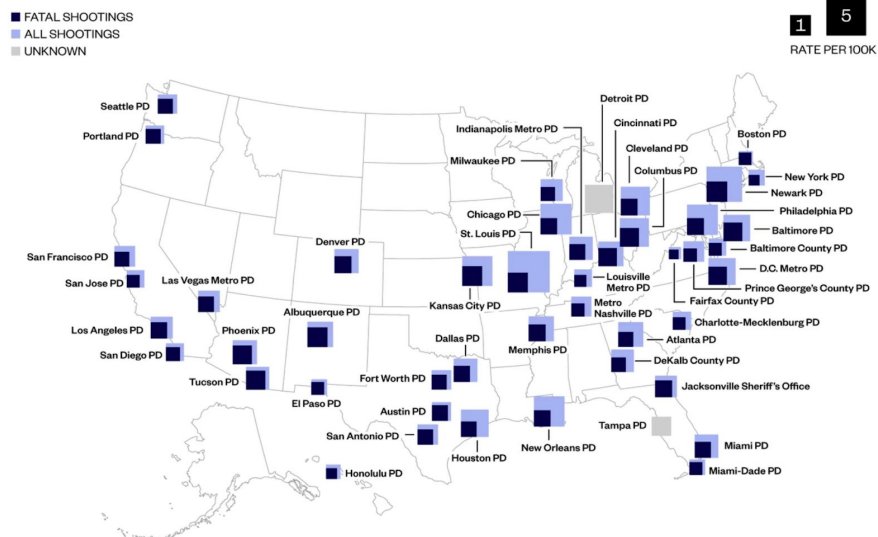
Where you live matters



- Shot by cops & forgotten (https://news.vice.com/en_ca/article/xwvv3a/shot-by-cops) - This article by VICE news shows police shootings across all states but this visualization shows both fatal and non-fatal incidents. Since our focus was only on the comparison of fatal incidents, we used a variation of the above visualization and created choropleths to show the number of fatal police killings across different years.

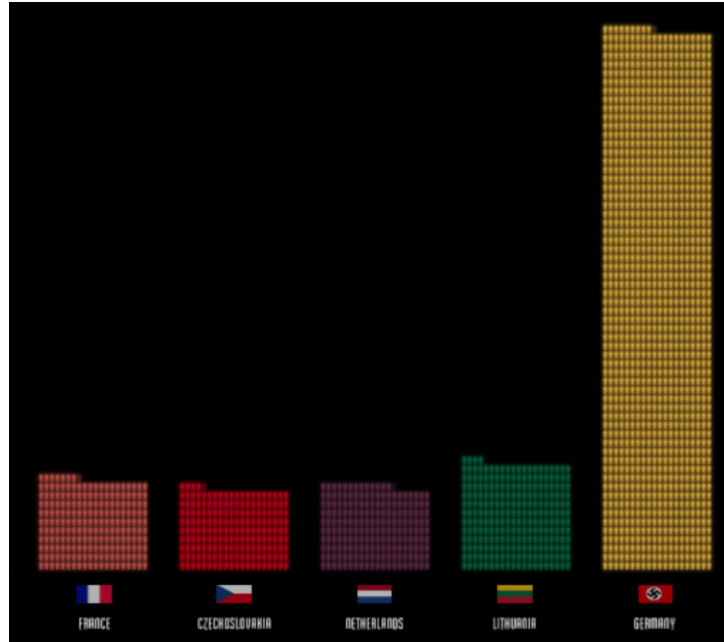
Police shootings in the largest local departments

ANNUAL RATE PER 100,000 PEOPLE



Source: VICE News

- The fallen of World War II (<http://www.fallen.io/ww2/>) - This was a very interesting visualization shown to us in one of the lectures and we really wanted to try and create something similar for our D3 visualization. This particular visualization shows different bins for people killed belonging to different nationalities. We used a similar idea to create bins for people killed across three different facets- body cameras (on/off), mental illness (yes/no) and fleeing (yes/no).



- Fatal force

(https://www.washingtonpost.com/graphics/2018/national/police-shootings-2018/?utm_term=.7b71c812befd)

The Washington Post
Democracy Dies in Darkness

Search Sections Sign In Subscribe

Fatal Force

370

people have been shot and killed by police in 2018

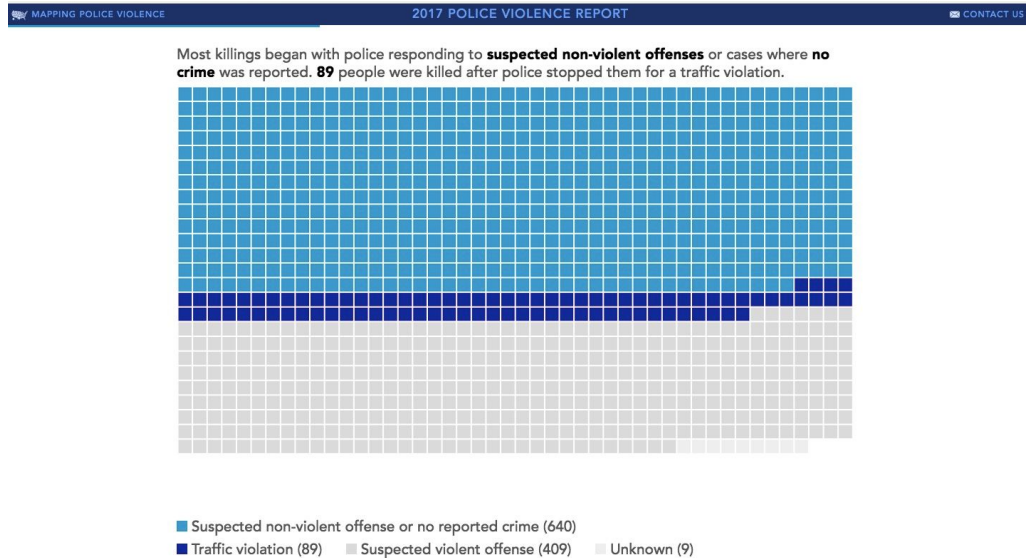
Read about our methodology. Download the data. See the 2017, 2016 and 2015 databases. Submit a tip

Updated May 3 at 1:31 p.m.

Search the database

This visualization, with its easy to understand visuals and clear hierarchy set a standard for the kind of one-page website we wanted to achieve. We were also inspired by how WP used filters in combination with the animation to really let the user go as granular as they want. Finally, we liked that they highlighted individual incidents and improved on it in the cover image of our website.

- Mapping police violence (<https://policeviolencereport.org/>)

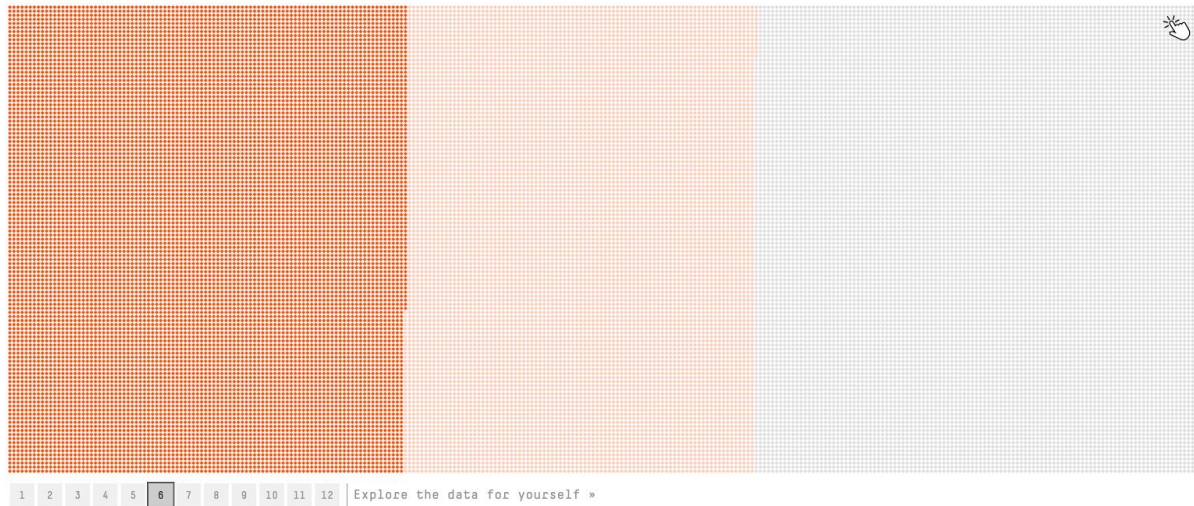


This visualization served as a great example of scrollytelling. We took some inspiration from how this achieves so much with so little text and found that animation was key in being able to make an impact. We also felt that this doesn't let you skip the visualization and just read the content if that's what you want. So we took care of that in our visualization and it's behavior on scroll.

- Gun Deaths In America (<https://fivethirtyeight.com/features/gun-deaths/>)

This website shows gun deaths in the US in the form of a grid-based visualization. The visualization changes on pressing buttons which is an idea we liked and wanted to incorporate in our D3 visualization. Instead of a grid, we used dots and add tooltips to those dots.

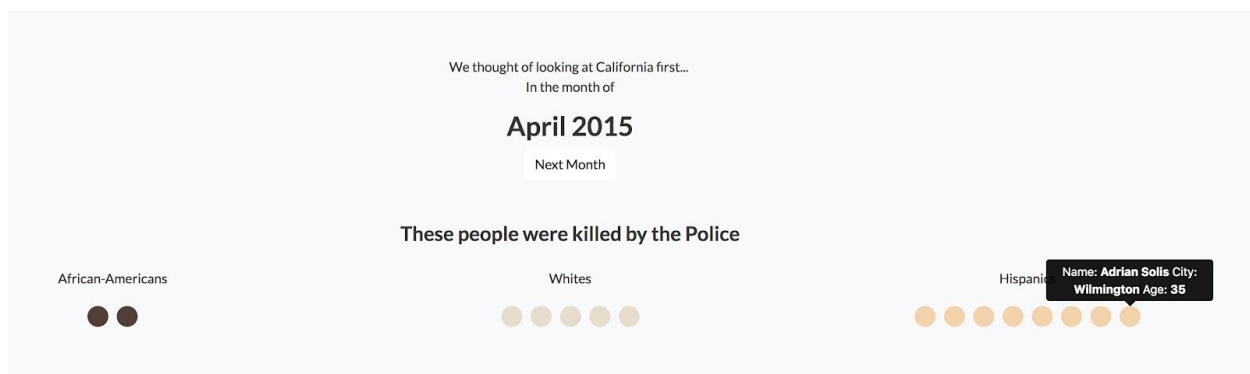
... and more than half of all suicides are **men age 45 or older**.



5. A description of the visualization, with adequate screenshots and/or illustrations.

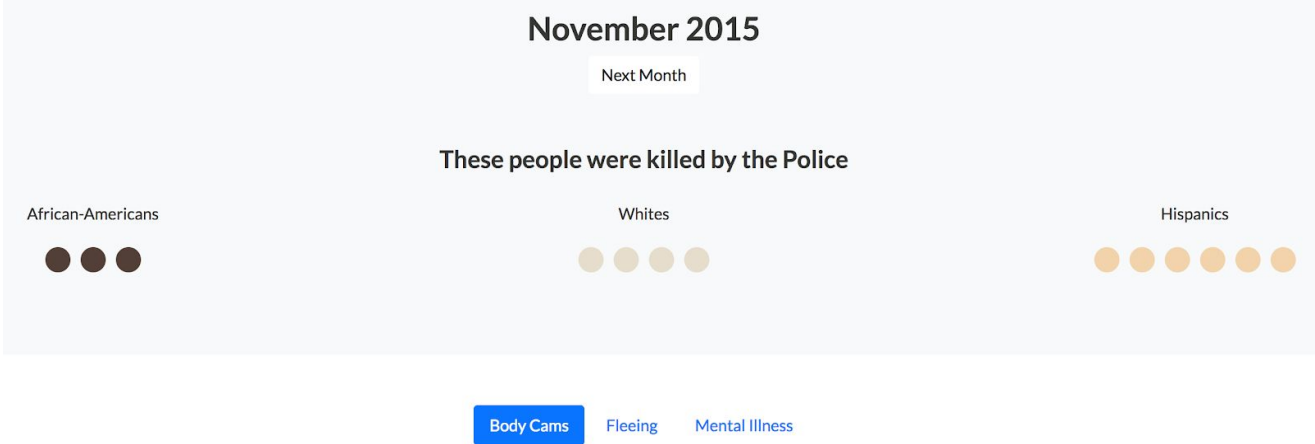
Be sure to have many screenshots. One strategy is to have a few in the main narrative of the document and a whole lot more in an appendix at the end. *A demo is for today, but a pdf is forever. You'll be glad to have those extra screenshots in some future date.* Optionally, also include a video of your visualization in action, either uploaded or on a hosting service. This is not a substitute for a good write-up however.

Our storyline starts with an incident in Sacramento in which a black man was killed by the cops because he supposedly had a gun when all he had with him was his cell phone. Keeping this story in mind, we decided to visualize police killings in California first.

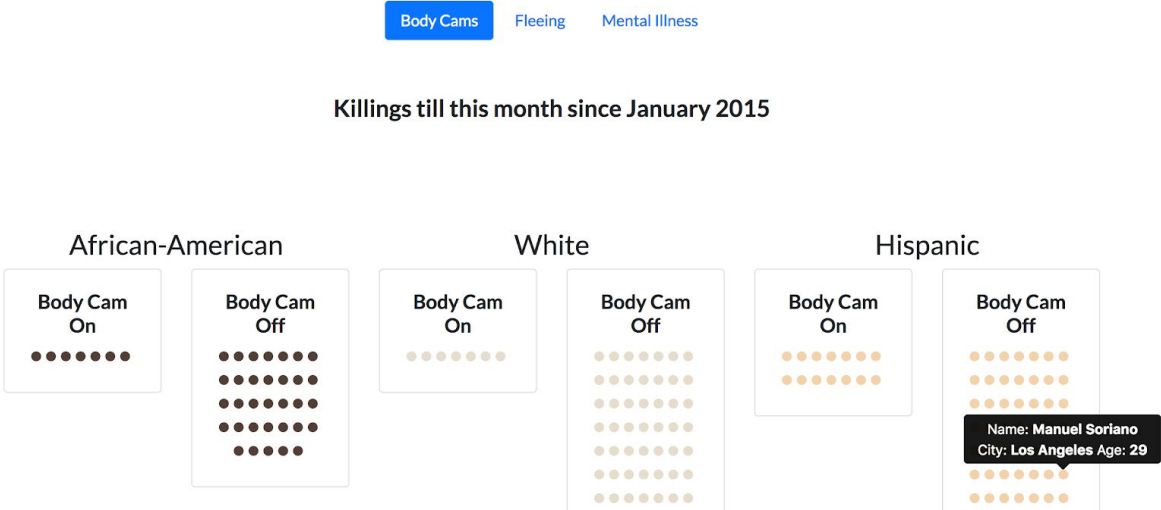


The above image is a part of our dynamic dashboard in which the data points change on pressing the 'Next Month' button. The tooltip feature shows the name and age of the

person killed and city in which the person was killed. The data points also change using the mouse-scroll action. The data points are categorized in 3 columns which represent the racial groups to which a person belonged. This is because on performing exploratory analysis of our datasets, we found that most of people killed belonged to three racial groups- African Americans, Whites and Hispanics.

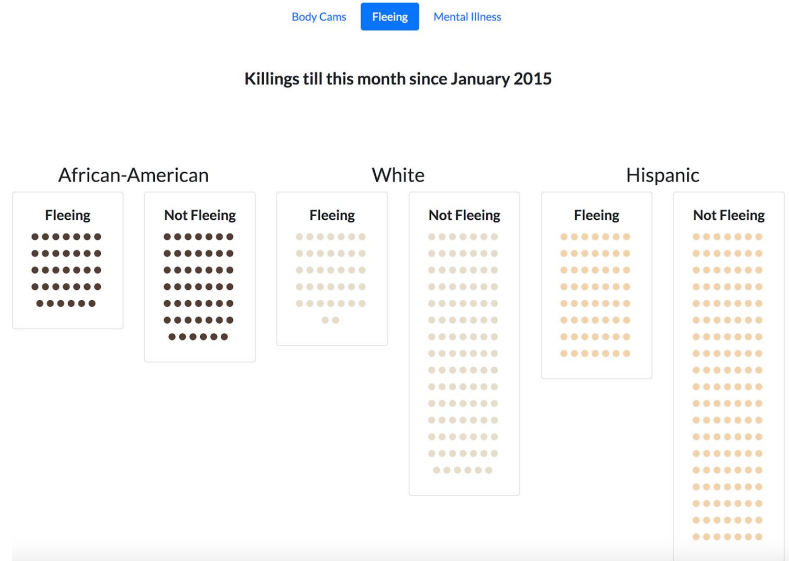


The killings were broken down into three facets- whether the police had body cameras on or not during the incident, whether the person killed was fleeing or not and whether the person killed was mentally ill or not. For switching to any of the facets, the viewer can simply click one of the three buttons. From a design perspective, the viewer can easily see at all times which button she/he has pressed.



On scrolling through this section, one can see the data points (the people killed) accumulate in different bins. Comparison of the number of people killed can be done simply by looking at the size of the bins. For ex- more hispanics were killed with body cameras turned off than whites or african american. Comparing ratios of racial groups is

also much easier in this style of data visualization. For ex- the highest ratio of people killed who were fleeing to people killed who were not fleeing was for the african american group



After exploring the state of California, we switched our attention to five most populated states in the US, which includes California. We picked these five states because these states have witnessed the most crimes as compared to the other states. The idea was to compare police killings over a 3-year period across two facets that we were most interested in:

- Percentage of killings in which police did not turn on their body camera
- Number of people who were fleeing during these incidents

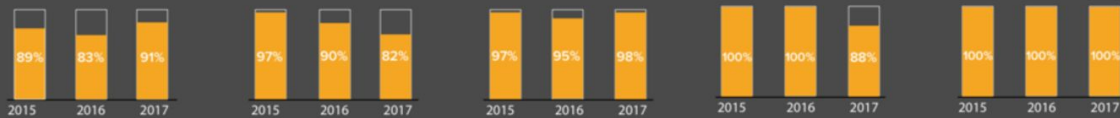
We were surprised to find that from 2015 onwards, in all five states, the percentage of killings in which the police did not turn on their body cameras was above 80%. Another surprising trend that we found that was that the number of people who were fleeing had gone up in 2017 in all five states.

We compared the killings in California to those in the next most populated states

People killed



Police killings where body cameras were not used

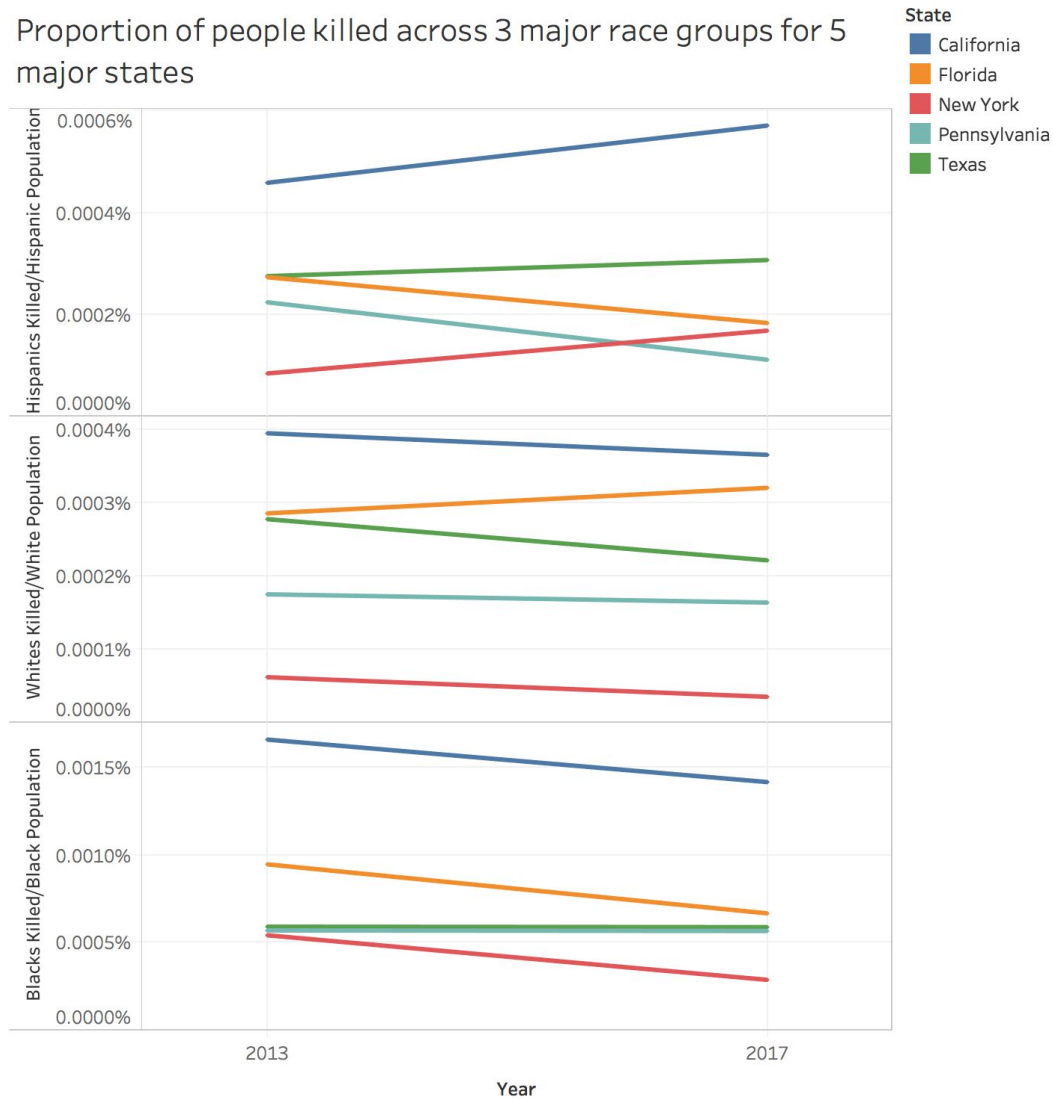


Police killings where victims tried to flee



We wanted to see the proportion of people killed, as a percentage of population for the three major race groups. This could have helped us in knowing if there were any racial biases with more confidence. Finding this information was a challenge for us since census data of all race groups for the five states is not available on an yearly basis. We still tried to find the population of different race groups in the five states by extrapolating census data from 2013.

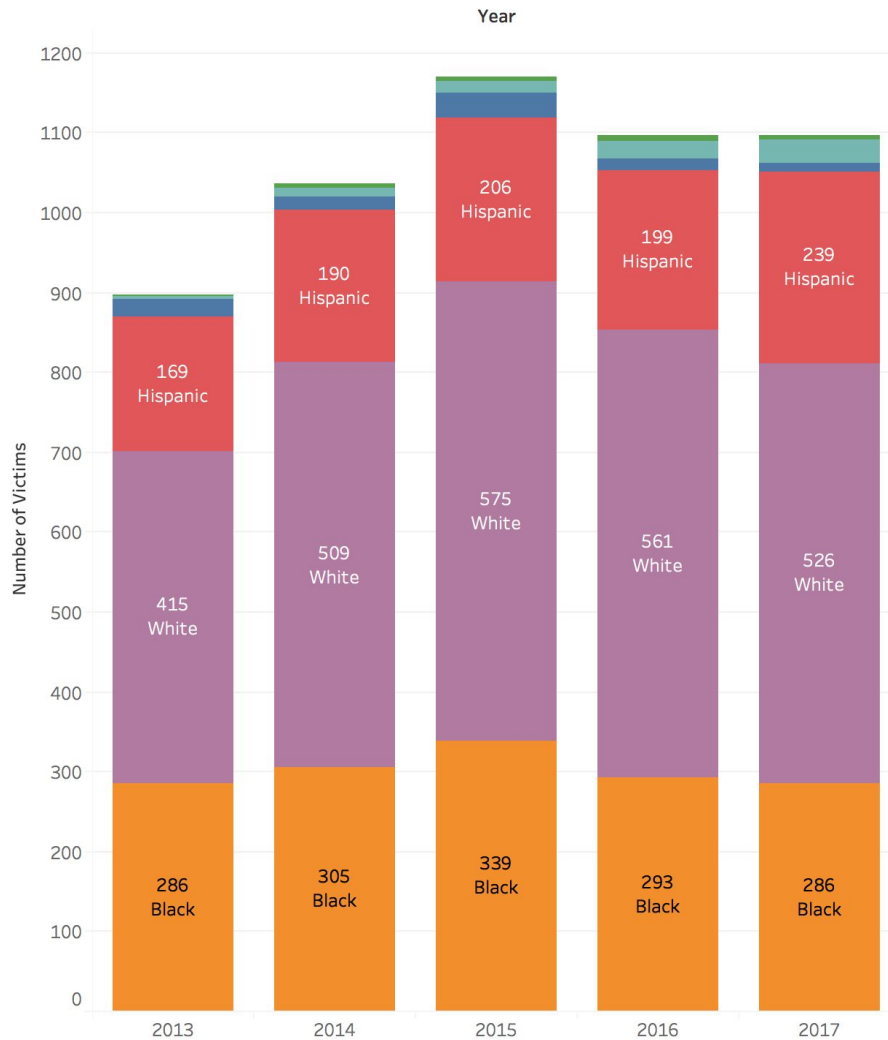
Proportion of people killed across 3 major race groups for 5 major states



The only proportion that seemed to show an increase in most states was of the hispanic people killed. However, we did not want to mislead the viewers with this since our methodology of computing population of the three racial groups as not very sound.

After California and the five most populated states, we decided to shift our attention the whole of the US. In order to understand the bigger picture, we first decided to visualize the number of police killings across the US across different racial groups.

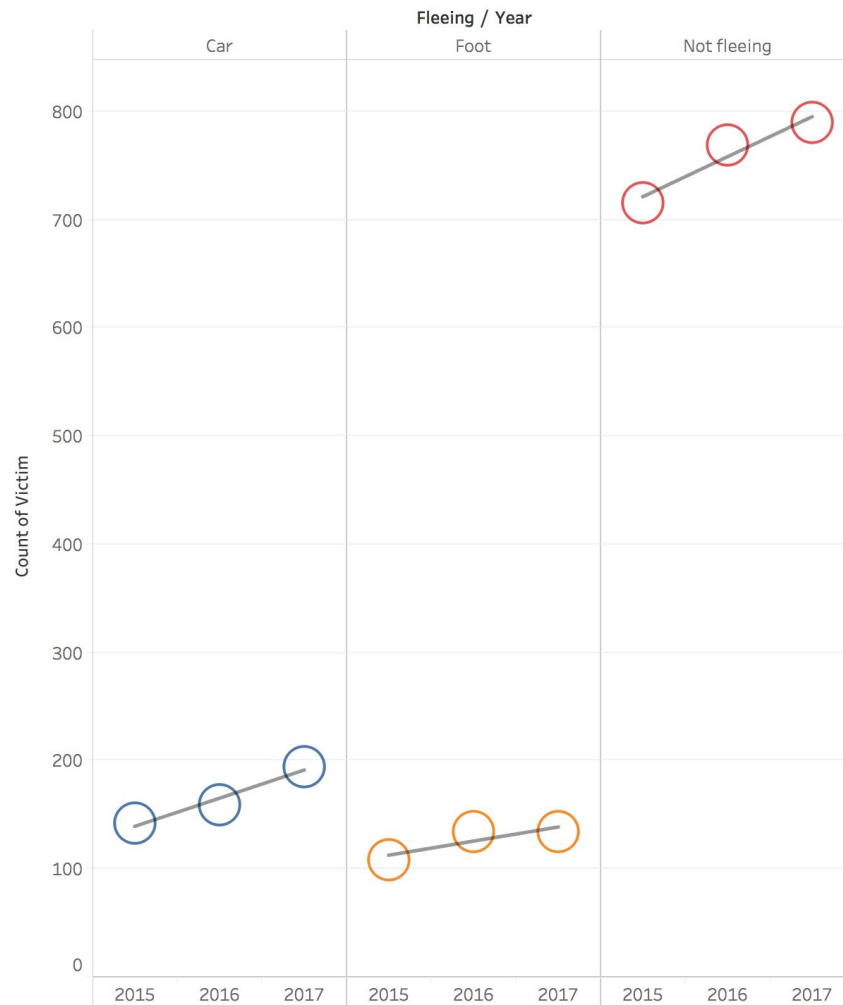
Year-wise police killings across 3 race groups for all US states



An interesting note in this dataset is that includes data from 2013 which is the time when the 'Black Lives Matter' movement had started. The number of african americans killed increased from 2013 to 2015 but reduced from 2015 to 2017. There hasn't been a decrement in the number of african americans killed. However, african americans were not the most killed people by the police from 2013 to 2017. Whites were killed the most during this time and similar to african americans, this number increased from 2013 to 2015 and then reduced from 2015 to 2017. Based on this visualization, 2015 seemed like an year when the police killings were at their peak.

Next we wanted to see if fleeing or not fleeing impacted the number of killings. We saw that the number of people who were not fleeing was much higher than the number of people who were fleeing either by car or not foot.

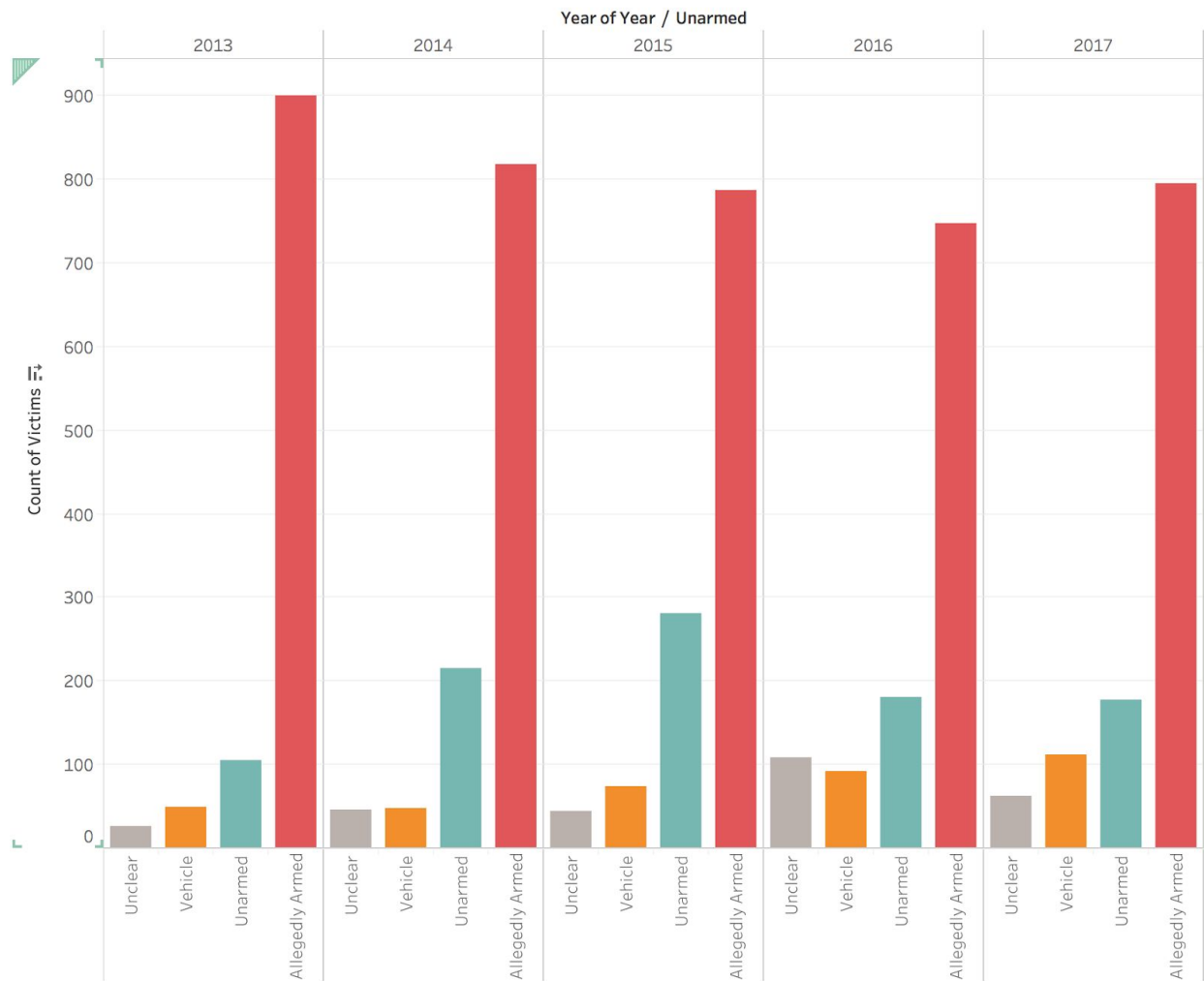
Whether people killed were fleeing or not



The number of people fleeing on foot, on car and the number of people not fleeing saw an increase from 2015 to 2017. It would be interesting to know why more number of people who didn't feel were killed. To understand this, we would require to include qualitative inputs from the police to know what exactly was it that the people who did not flee were doing. The datasets that we found did not capture this information clearly enough to draw any conclusions. While it is generally advised to not run when confronted by the police, people who were killed while fleeing may or may not have been a threat to the general public. It was unclear to us from the data whether or not the fleeing people were a threat to others or not.

In order to understand the circumstances in which the people were killed, we tried to visualize the threat level of the person according the dataset.

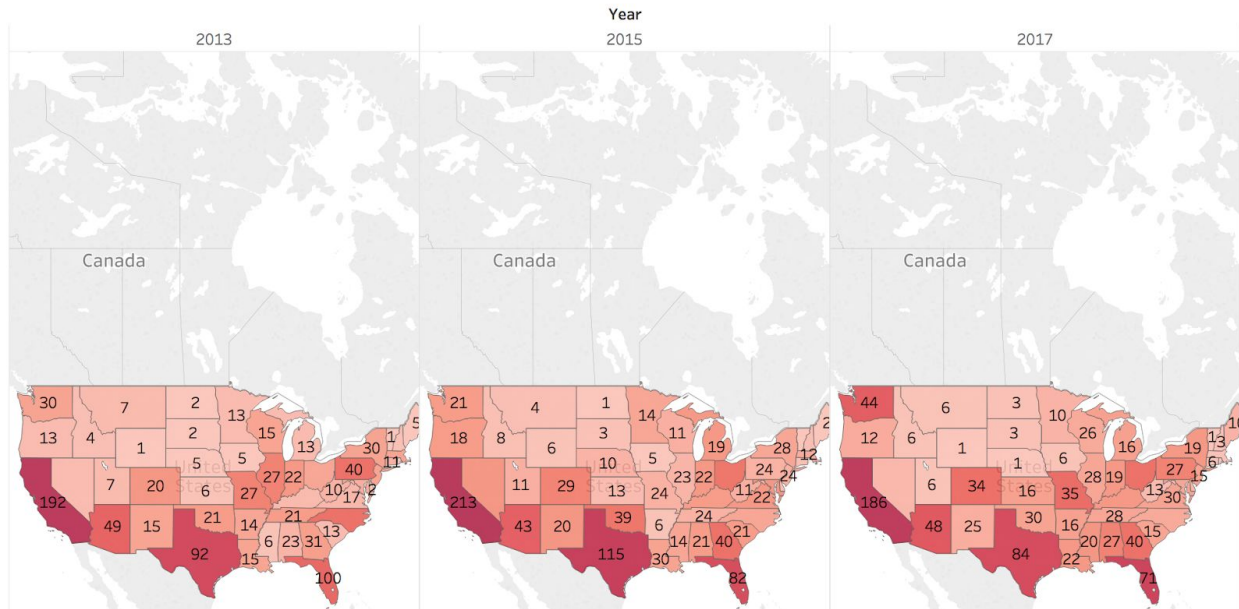
Yearwise Trend of Threat Level of Victims Across All States



The visualization above shows that most people killed were “Allegedly Armed”. It was not very clear from the data if these people had threatened the police officers with the weapon or object they were armed with. A surprising outcome of this visualization was the increase in the number of “Unarmed” people killed from 2013 to 2015. Though this number did go down after 2015, the number of unarmed people killed in 2017 was still greater than the number killed in 2013.

Lastly, we wanted to see the number of people killed across different states followed a trend or not. To do so, we used choropleths to compare the state-wise killings in 2013, 2015 and in 2017.

State-wise comparison of people killed by the police (2013 vs 2015 vs 2017)



Based on the choropleth above, we can see there are no uniform trends. States like California, Texas and Florida saw most police killings in 2015. Other states like Washington and Colorado witnessed a higher number of police killings in 2017. In general, the number of people killed in different states has not reduced significantly in most states.

6. What data were used to accomplish the goals.

We primarily used datasets from 2 sources:

- <https://mappingpoliceviolence.org/> - 5670 records
- <https://github.com/washingtonpost/data-police-shootings> - 3259 records

Both these datasets contained similar information but we had to use them both since of them had data from 2015 to 2017. Since we wanted to see the effect of the 'Black Lives Matter' movement, we wanted to use data from 2013. These datasets contained the following information:

Field Name	Field Description
Victim Name	Name of the person killed
Victim Age	Age of the person killed
Victim Gender	Gender of the person killed

Victim Race	Race of the person killed
Date of Incident	Date on which person was killed (mmddyy)
City	City where the person was killed
Cause of death	How the person was killed
Mental_Illness	Whether the person killed was mentally ill or not
Unarmed	Whether the person killed was unarmed or not
Alleged_Weapon	Type of weapon or object the killed person had on her/him during the incident
Alleged_Threat_Level	The threat level posed by the person
Fleeing	Whether or not the person killed was fleeing
Body_Camera	Whether or not the police officers had their body cameras during the incident in which the person was killed

Though we had a lot of features, not all of them were useful to us and contained ambiguous or unclear values. Features such as 'Unarmed', 'Alleged_Threat_Level' and 'Alleged_Weapon' had unclear data for more than 50% of the records. In order to use these features, we would had to drop those records which did not seem like a sound approach.

7. Which tools were used to accomplish the goals.

We used the following tools for accomplishing our goals:

- D3- We used D3 to create the dynamic dashboard to show police killings in California across three different facets (body camera, mental illness, fleeing/not fleeing). Using D3 enabled us to use buttons and the mouse-scroll to change the data points based on the month of killing and the facets.
- Python- For creating JSON objects that contained the data to be used in the D3 visualization, we used Python. After finalizing the information that we wanted to display in the D3 visualization, we wrote a script in Python that extracted the

relevant information from the dataset in the form of JSON objects and used these JSON objects in our HTML file.

- Tableau- The static dashboards (bar chart, line chart & choropleth) for showing the killings in the US, we used Tableau. The links to these dashboards were embedded in our HTML file. We also performed our exploratory data analysis on Tableau.
- Illustrator/Sketch- Some of the results from our exploratory data analysis were converted to an infographic using Illustrator and Sketch. This file was then used in the HTML file as an image.

8. What kinds of results you obtained, with a focus on usability tests or responses from prospective or real users.

We conducted 3 usability tests with people from diverse backgrounds and these are the results we obtained:

Person 1

“The cover image makes me interested in reading the whole thing but I am confused about the purpose of the dots”

This is when we decided to add some explainer text to our D3 animation and created rectangles around the accumulating circles so the user can see clearly and infer easily what the visualization indicates. In response to this test, we also added tooltips to the dots which the user can see on hover and understand what it means.

Person 2

“Data on California is great but I want to know what’s happening in other big states before reading about all of the US”

This is when we incorporated the infographic on the 5 most populous states to serve as a bridge between California and the rest of the US. This also helps our narrative flow more smoothly.

Person 3

“I don’t understand the difference between people killed and people not killed. Is there a way to show that?”

Unfortunately, our dataset (and multiple others that we looked up) does not provide a measure people not killed when the police fired at them, hence we can’t show that.

Person 4 (feedback received during project proposal presentation)

“Good job on presenting this serious issue with different visualizations. Maybe you could consider bringing in something that reflects the point of view of the police officers”

We couldn't really find any data that reflected the point of view of the law enforcement on these incidents. But because our idea was to try and show the complete picture, we included a couple of quotes by the police on their outlook towards police brutality.

9. Links to demos, documents, or whatever is needed to show the visualization.

Our website with all the visualizations can be found at:

<https://sandeepal1991.github.io/teamsam/>

10. A table showing which parts were done by each student, and in what proportion approximately. This is a requirement, and must be provided in detail. If it is not sufficiently detailed, points will be deducted. We reserve the right to assign different numbers of points to team members if necessary.

Task	Abhishek Sinha	Mudit Kakkar	Sandeep Pal
Exploratory Data Analysis	40%	30%	30%
Tableau Visualizations	60%	20%	20%
D3			100%
Narrative Infographic	30%	70%	
Website Design		50%	50%
Usability Testing	33%	67%	
Data Extraction & Manipulation	70%		30%
Final Report	40%	30%	30%

11. (In addition to the report, uploaded separately) A small thumbnail image (100x100 pixels) to be used to illustrate your visualization on the course final project web pages.

12. (In addition to the report, uploaded separately) Software created, to the degree this is possible. I realize there may be issues with sharing data, or datasets may be too large to share directly; links to repositories, or the software itself without the data is acceptable. Also, if you used external software packages you may include only the software your team wrote.

Here's the link to our Github repo: <https://github.com/sandeepal1991/teamsam>