Project Proposal
CS 360: Data Visualization
Spring 2018
Rawan Al-Mobarak - rbalmobarak@dons.usfca.edu, rbalmobarak
Sahil Jain - sjain13@dons.usfca.edu, sjain13
Project Repository: Repository
Project Website: Website

Project Title : **A Quest for 2nd Amendment**

Background and Motivation:

Based on the current events that have been taking place in the US over past few years related to gun violence and gun crimes the movement for strong gun laws and repealing 2nd amendment have been on the rise. The recent outburst has been caused by Florida high school shooting which leads to the death of several young individuals, and last year Las Vegas shooting, Texas church shooting was also some very disturbing events that lead to the need of stronger and stricter background check and gun control laws. Recently in California, in YouTube headquarters, a shooting incident took place as well, resulting in the injury to 3 people. Gun violence-related crime has been on the rise from past few months now and by visualizing data it can be clearly seen that whether gun violence crime over the span of years have gone down or have they rose in numbers. The motivation behind choosing this particular project is to provide solid evidence in favor of an argument. According to the 2nd Amendment "A well regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed" is a constitutional right for every American Citizen just like other laws. Clearly, the main aim of our project is to provide our own opinion through data but not to advocate against or in favor of gun laws, all our project will be trying to do it to tell a story about gun violence with help of visualizations and data.

Project Objectives:

The primary questions we are trying to answer with our visualizations are "Should there be stricter gun laws and background checks before handing out guns to Citizens and also Is it right to repeal 2nd Amendment? " As International Students, this project will not only help us in accomplishing solid data visualizations skills, but it will also help us know more about the history of crimes related to guns in the past. One of the main objectives of this project is to compare the US gun violence Data with data from different countries in the world to evaluate where exactly the US stands in the world ranking in terms of firearms crime. Here is the list of benefits we hope to accomplish after completion of this project:

(1) Interactive Visualizations
(2) In-Depth knowledge of visualizing software (D3, R, and Tableau)

(3) Finding a correlation between History, Politics, and Technology
(4) Coding skills
(5) Incorporating machine learning in political and historical trends
(6) To see if guns are actually dangerous or are there other ways of fatality as well

Data:

Data for this project will be gathered from 3-4 possible sources, and those sources are (links attached) :

(1) FBI : https://ucr.fbi.gov/crime-in-the-u.s/2011/crime-in-the-u.s.-2011
(2) Kaggle : https://www.kaggle.com/gunviolencearchive/gun-violence-database, https://www.kaggle.com/carlosparadis/stanford-msa, https://www.kaggle.com/zusmani/us-mass-shootings-last-50-years
(3) The Guardian : https://docs.google.com/spreadsheets/d/1chqUZHuY6cXYrRYkuE0uwXisGaYvr7durZHJhpLGycs/edit#gid=0,

https://www.theguardian.com/news/datablog/2012/jul/22/gun-homicides-ownership-world-list

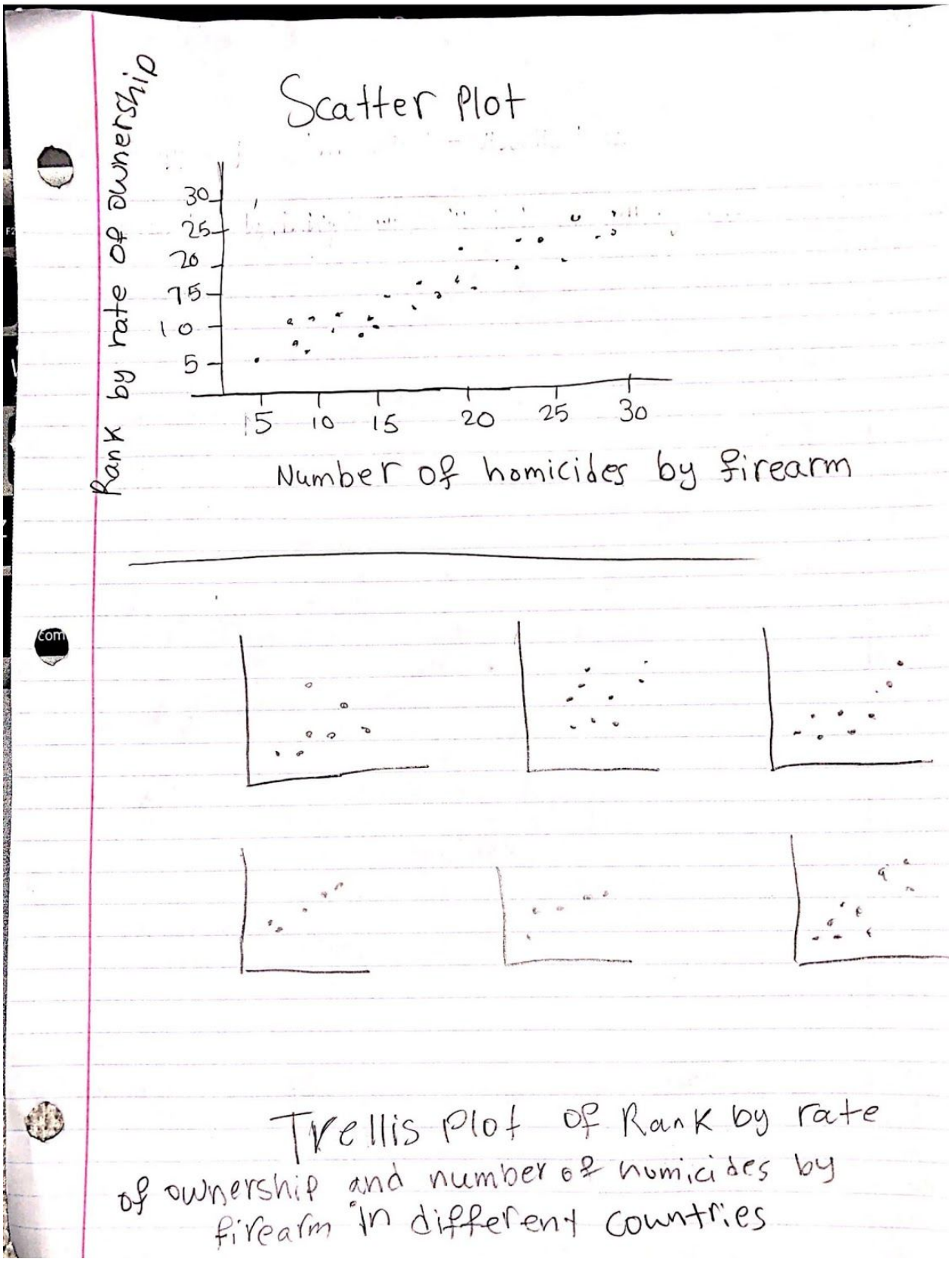
(4) Mother Jones: https://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data/

Above are the links as well names from where we will gather our data for this project.

Data Processing:

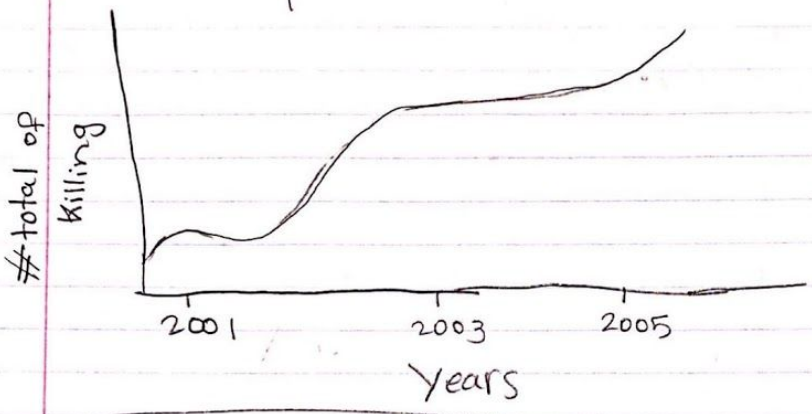
There will be no substantial data cleanup required however variable names might be changed and made to simple English to make it easier for us to understand these variables while coding. However, while comparing the US firearm data to the Rest of the World firearm data we might come across few empty values which we might have to change or delete out of the dataset. Quantities we're trying to derive from our data will be pretty much Ordinal and Numerical, where countries, state, universities, mental health, schools, and cities will work as Ordinal whereas Mass-shootings, fatalities and injuries. Overall, there will not be too much data processing as most of the data will relatively straightforward, but we will be deleting some extra columns which we will not be incorporating in our project and to accomplish that goal we will be using R extensively to modify or process our data in order to make it work for our project.

Visualization Design:

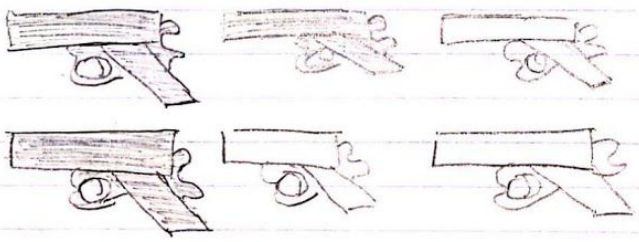


IV Design IV comparing US w/ ROW and Zooming into US only and different state. → Preferred design.

① Line chart of total killings by shooting in world over years. which will then breakdown into different continents and from there the comparison will start on.

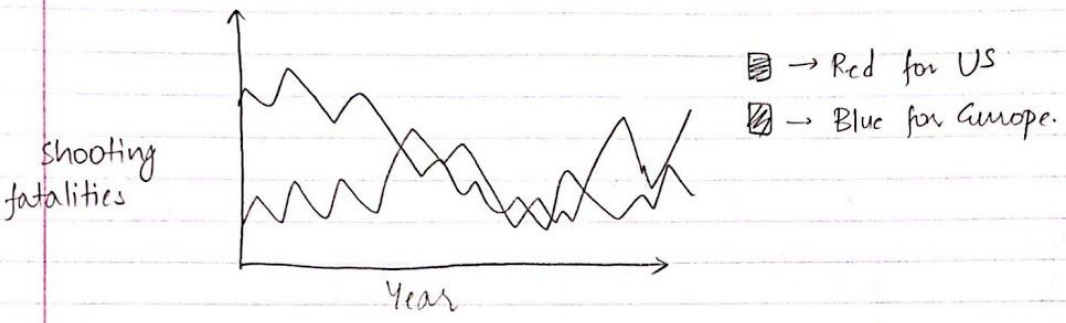


Number of gun ownerships in countries over the world, visualized in an artisty way. owned guns colored, not owned are not colored

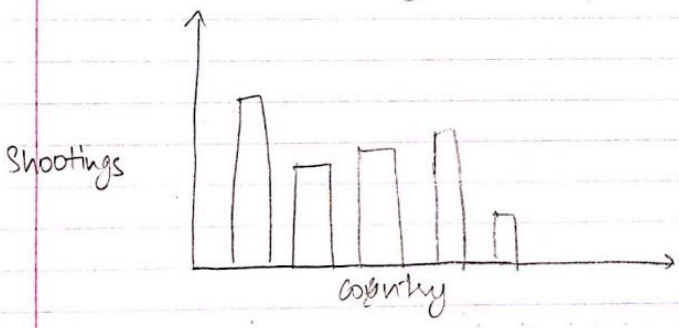


(II) Design II - Compares US and Europe.

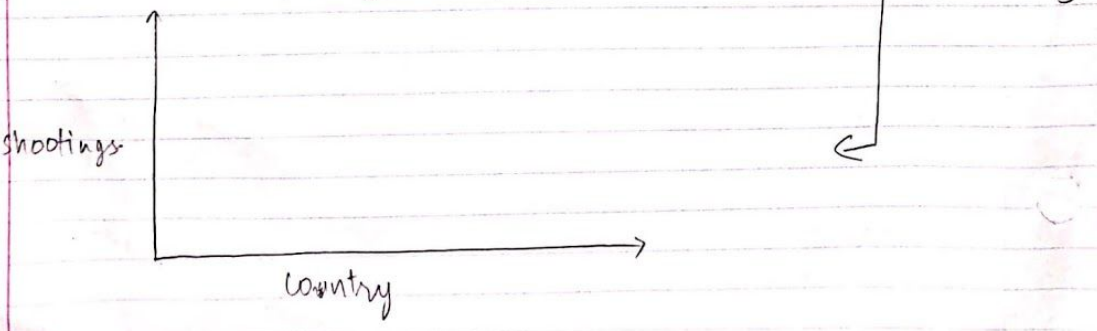
(1) Bi-variate line chart (US Vs Europe)



(2) Bar chart of comparing US w/ 5 european countries

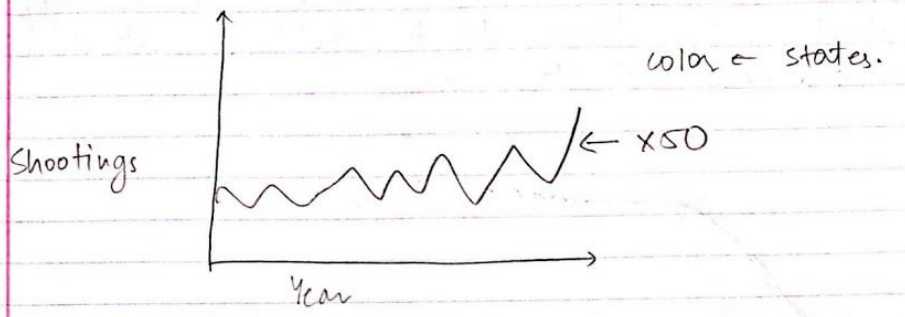


(3) Bar chart of comparing different European countries.

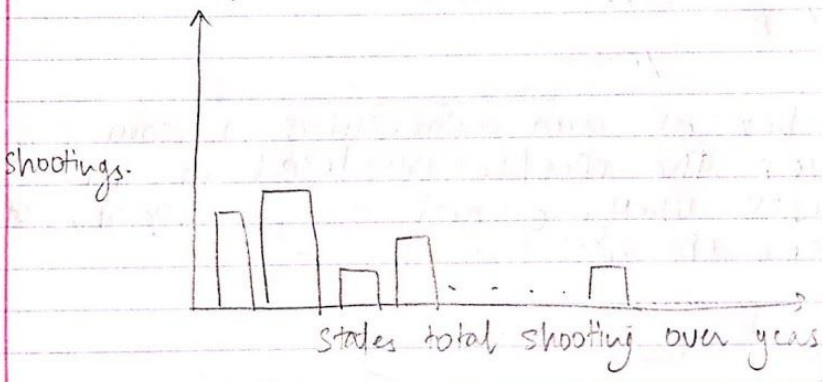


(III) Comparing All 50 +1 US State with each other.

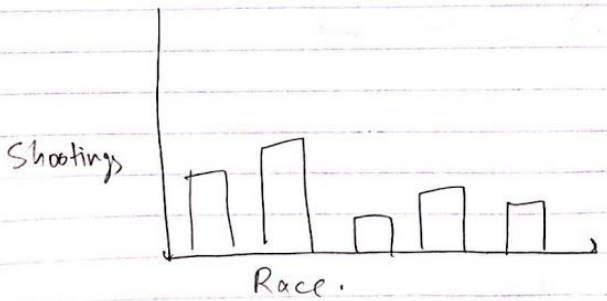
(1) Line chart showing shooting variation in all 50 states over year



(2) Bar chart of total shooting in each state.



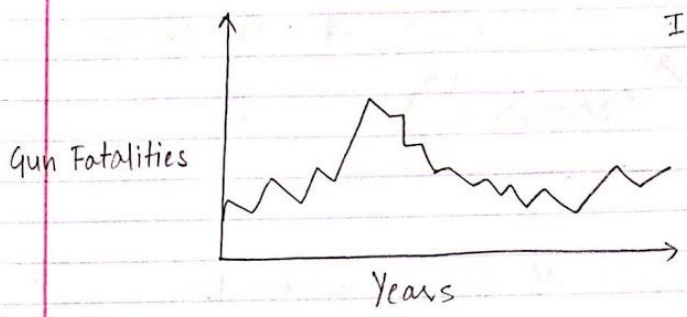
(3) Shootings by Race (line chart and Bar chart)



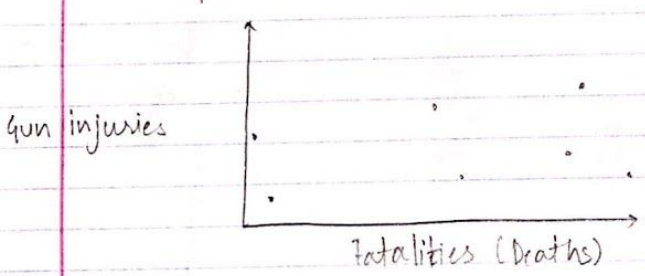
Visualization Designs

DESIGN I → Focus only on US.

① Line chart



② Scatter plot (Trivariate)

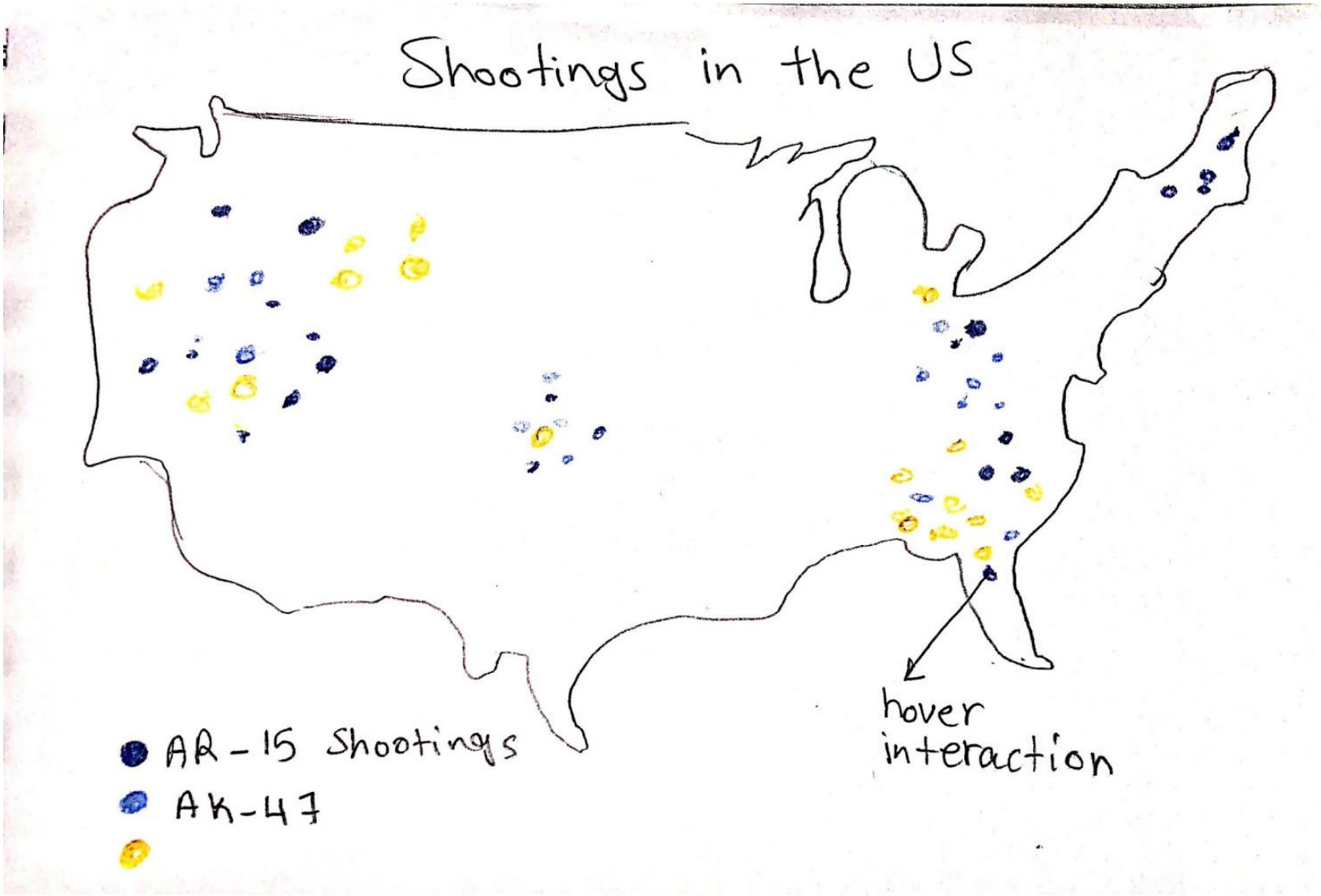


□ ← color (Mental health) or (Race)

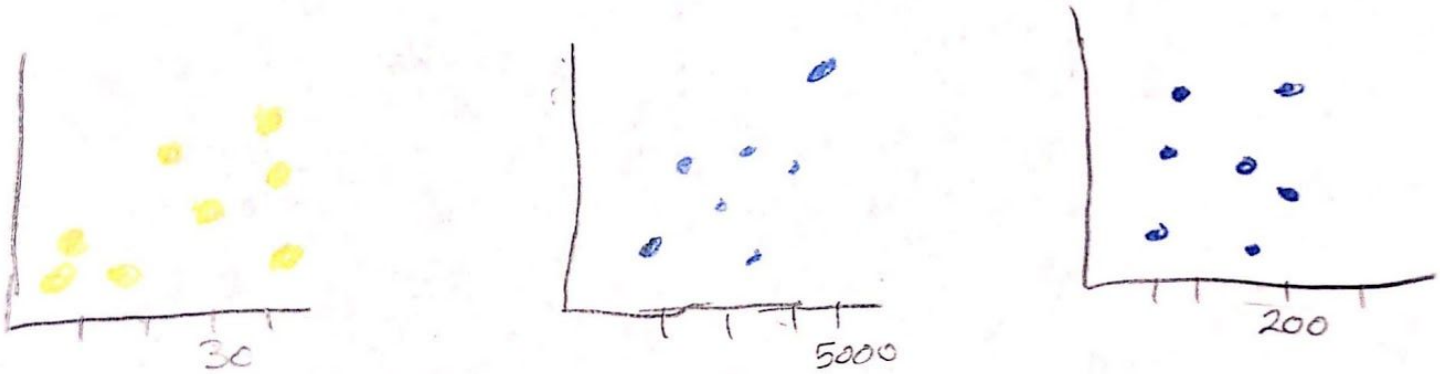
③ Geo-Map Viz of Most shootings over years.

← dark means high number of shootings

← light means less number of shootings



Same concept as the above but A Trellis Plot (Shootings in the US)

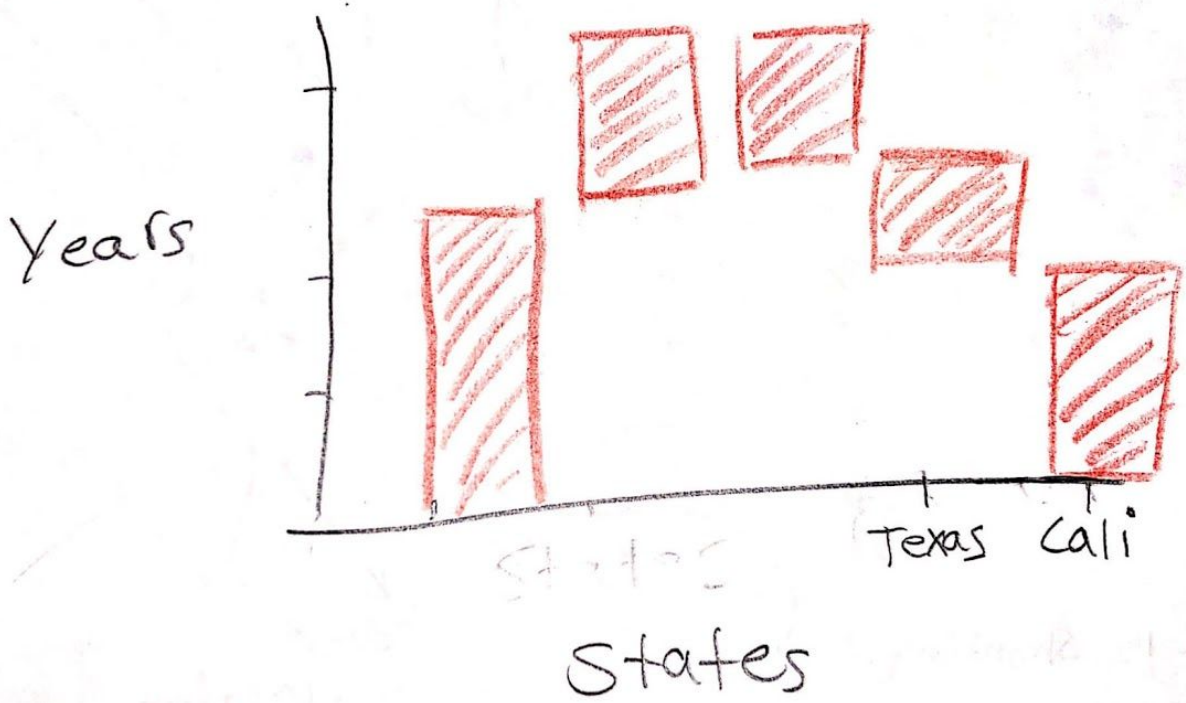


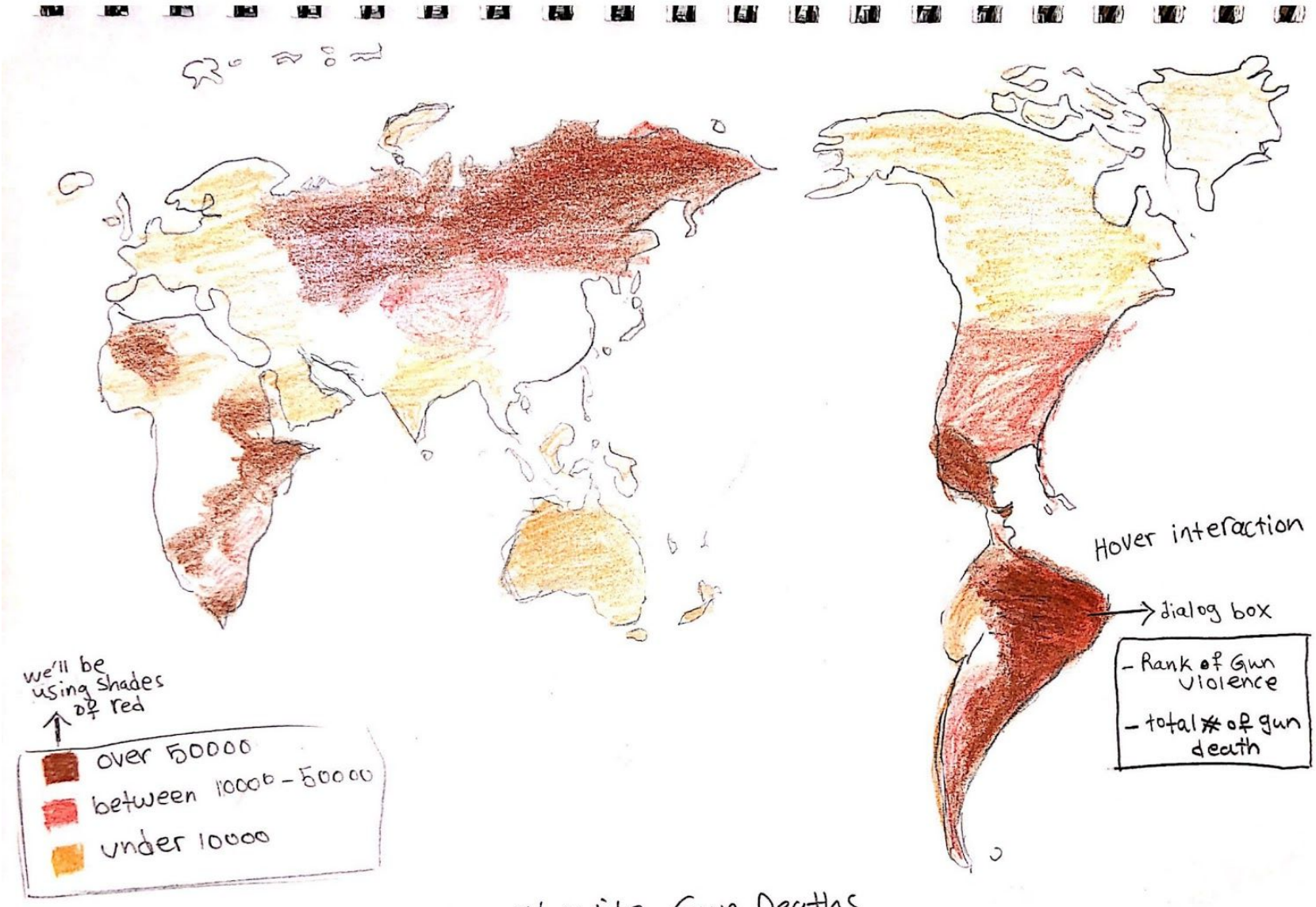
AR-15 AK-47

Rank by rate of ownership

# of homicides by firearm

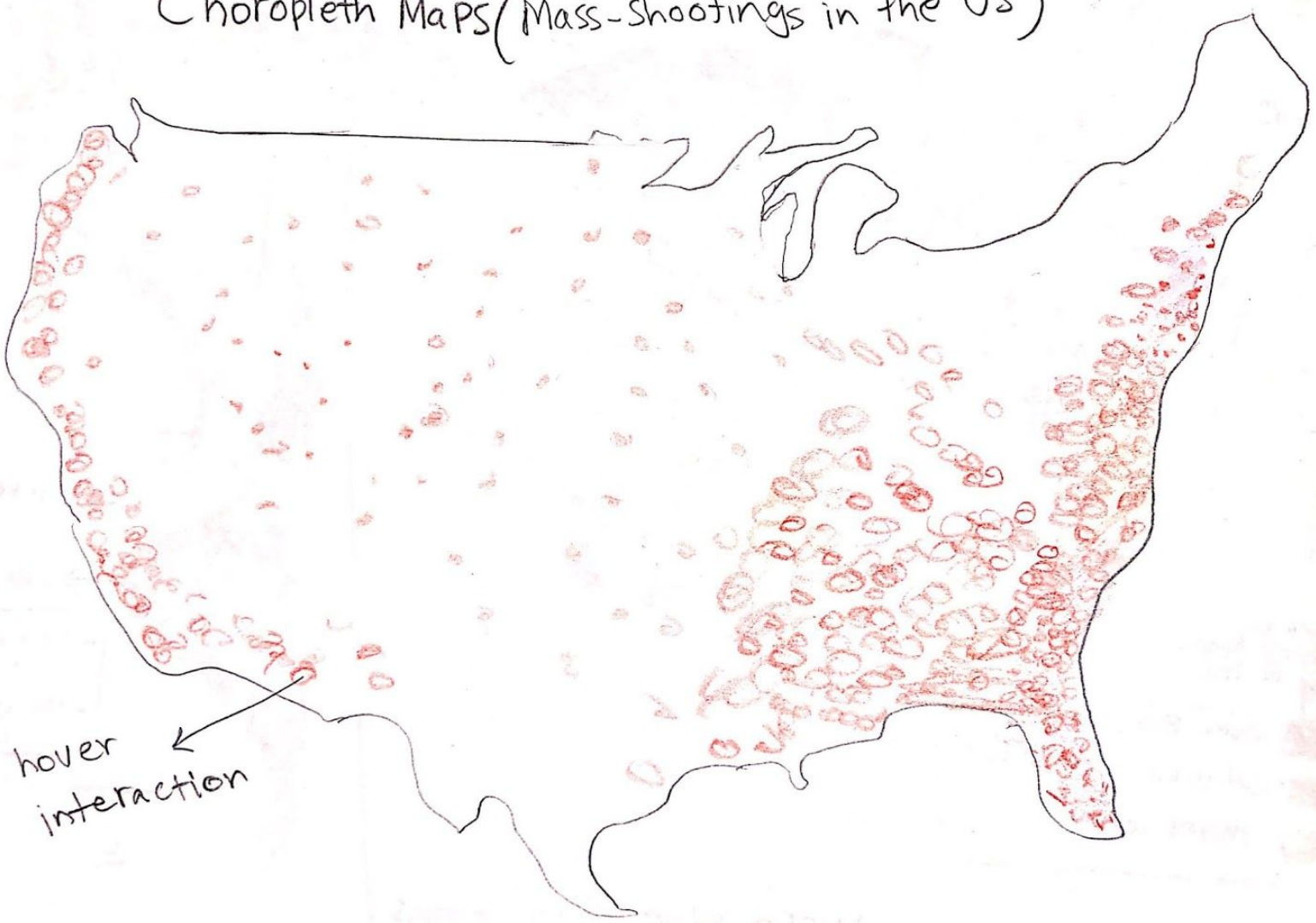
Waterfall (Shooting in US)





World wide Gun Deaths

Choropleth Maps (Mass-Shootings in the US)



1. Ideas

- Gun ownership map (Geo map) across the world
- Breaking down to top 5 Gun owning countries in the world.
- Comparing Gun crime b/w US and top 5 Gun crime countries in Europe
- Comparing US with top 5 Gun crime countries in Asia, Africa.
- General overview of Gun crime comparisons.
- After comparing different countries we will break it down only in US.

2. Filter

Breaking down Gun crime in US.
Making a line chart to show the trend of Gun violence in US, Bar chart of Gun crimes per state.

3. Categorize

Categorizing the data with respect to different states, Race, gender, mental condition and shooting (If Mass shooting or not a mass shooting).

4. Combine and Refine

Now Binging everything together. First we will look at whole world, then only at the countries with high Gun crime and Rank them accordingly and see where US stands in those rankings.

In more narrow Aspects Ranking different US states based on gun crime and see which states rank higher and which states rank lowers. Using Barcharts, Pie charts and Area graphs.

5. Question

Should there be stricter gun laws or should 2nd Amendment Really needs to be repealed.

These are the possible visualization ideas that we will be following throughout the project. The data will be visualized using a lot of graphs like Bar graphs, Scatter Plots, Line charts, geo map, trellis plots and multivariate scatter plots. Now our final design will look something along the lines of the last picture posted on the last page. A basic comparison will start by looking at gun crime all across the world, which furthermore will break down to the US and comparing the US to other countries in the world. Finally, ranking the countries based on the gun violence and asking the question as stated above in the design methodology.

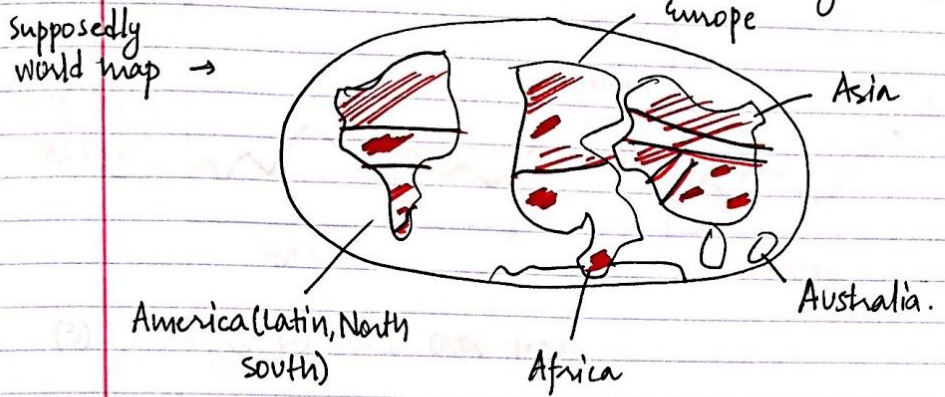
Below is the attached picture and description of how our final dashboard will look like:
First, we will be starting with a wide comparison between all countries of the world and ranking them based on gun deaths in the country. It will be shown a geography graph with a user interaction. In the geo-map graph, all the countries will be shown in red color and white black background. Darker the red color more are deaths by gun in that specific country. Apart from that, whenever a user hovers over the country it will provide a small dialogue box which will be providing two specific pieces of information (i) Rank of the country in terms of Gun violence (ii) Total number of deaths by guns.
From our first graph, our story will start to dwell solely to focus on the US. This is where our main story starts as we will be visualizing data from past 15-20 years to see how the US has done over years in gun crimes. In this part of our project we will be dividing our project into two sub-parts (i) Mass-Shootings (ii) Random shootings with special use of color (in terms of guns used in those shooting, for example - an AR-15 will be colored blue etc.) From here we'll be using a different number of graphs to visualize the whole data. Using Bar graphs to show a number of shootings on the basis of guns used, race and which state had more shootings. Line chart will be used to show an overall change in shooting statistics over years which will follow same filter (race, guns and different states). Geo map will be used similarly to the world map to show which state in the US has more shootings both common and mass shootings and states will be ranked accordingly. In the geo map, in case of mass shootings that took place in that specific state, if we will hover over the state a dialogue box will prompt up with shooting year, shooters race, the number of people killed and summary of the incident. Last, ending with a line chart with shootings all across the board in the US over years which will show if the number has gone up or down, and finally ending with a question “should there be strict gun laws or should 2nd amendment really needs to be repealed?”

Visual representation below for final dashboard (subject to change) :

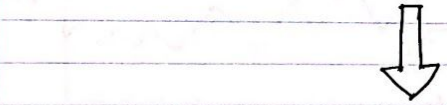
Final Dashboard.:

We will be following this design very closely but it is subject to change based on if we get hands on some new information.

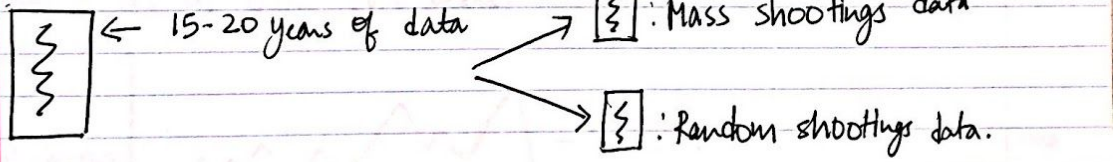
① Comparison b/w All countries and ranking accordingly.



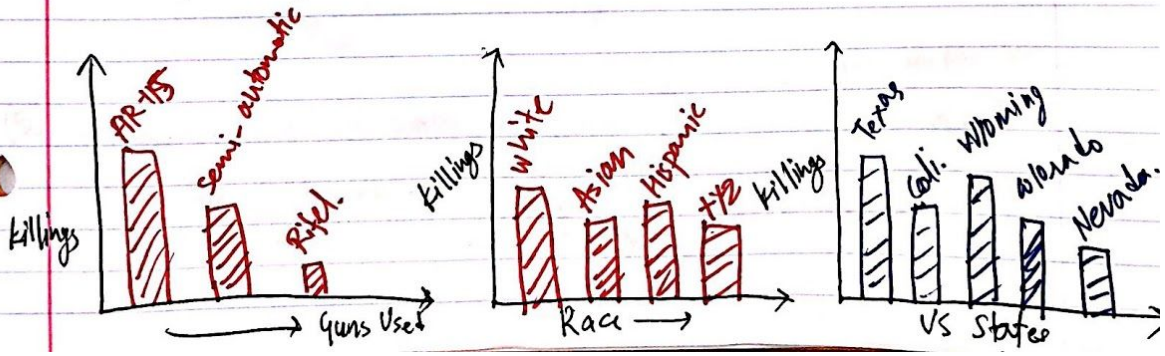
Here red color is used to show number of killings by guns. Darker the color more are the number of deaths.



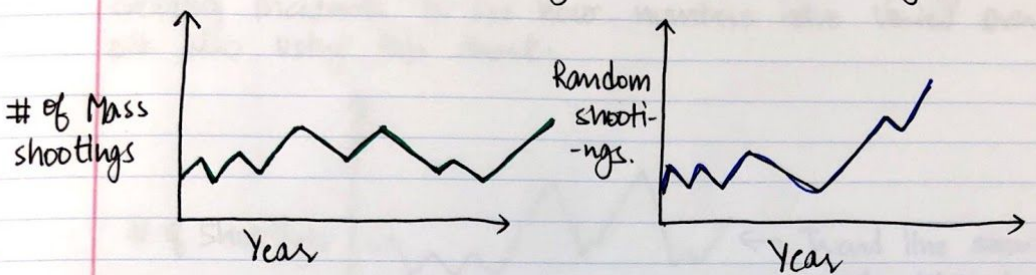
Focus will now solely shift to US, Based on the ranking and economy of US.



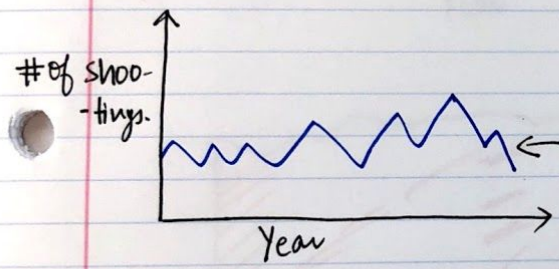
① Bar Graphs X 3 (i) Guns (ii) Race (iii) States



② Line chart : (1) Mass shootings (2) Random shootings.



(3) Shootings by Race over years.

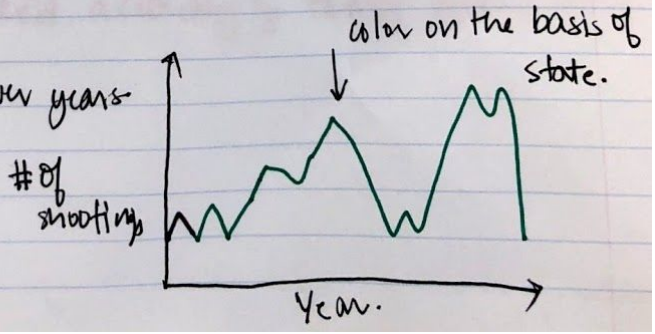


← line will be colored on the basis of race (tri-variate line chart).

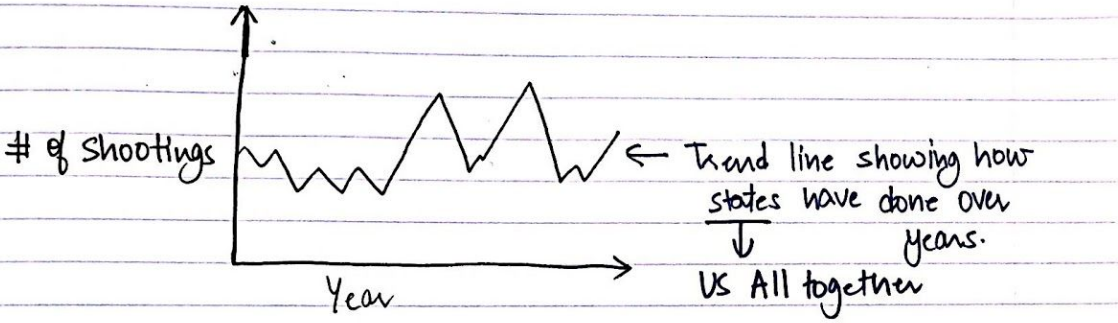
(4) Shootings by Guns over years.

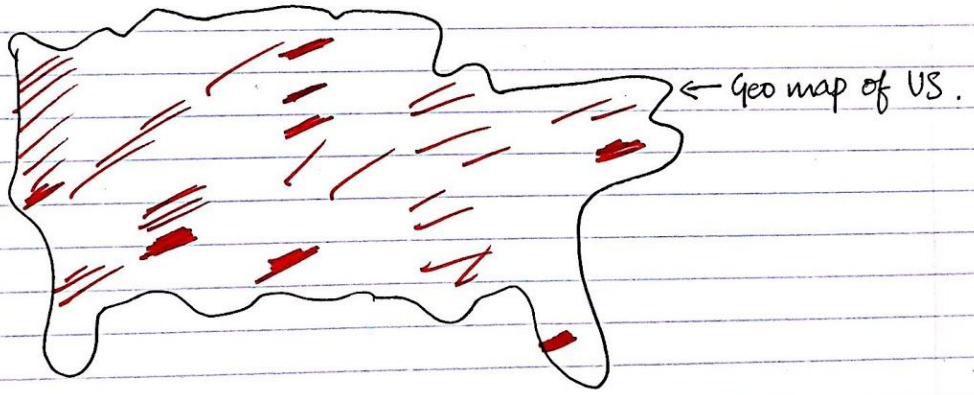
- line will be colored on the basis of ~~[illegible]~~ Gun used.

(5) Shootings in different states over years.
(will be only looking at selective states).



Bringing it all together Now with a US Geo map by combining all shooting incidents to see how numbers have varied over years, and ~~##~~ also using line chart.





Here red color will do the same task as teal of it did in case of world map by telling what states have high shooting activities; states would be Ranked accordingly. Finally ending with the voting question.

Must Have Features:

Any visualization is not complete without these few very important feature and those features are (1) User Interaction. This is by far the most important feature for any visualization. Since we're working on a data set that will be visualized in form of maps, bars, scatter plots and pie-charts and the user must be able to hover over this visualization which will then provide more information about the graphs and data related with the graphs.

(2) Color - In order to differentiate between different aspects of the data color has to be used extensively. For example, In maps, while visualizing all the states of the US we will use a different color so it'll be easier for the reader.

(3) Use of Slider Bar or Filtering : Since our data will be mostly a time series data and we will also be trying to visualize the different ways weapons of fatality used in the US in case of a fatality. Use of slider and drop down menu will make it easier for the reader to know more about how different weapons had different fatality rate. In case of guns, we can use the slider (in terms of years) to see how shootings across the US has varied over years.

(4) Story and goal: A visualization is incomplete without a story, so it is really important to have a story to tell with our visualization.

(5) Details on Demand: Every time, if we click on any part of the visualization reader, must be provided with some extra bit of information only if it is necessary, as we will try to provide as much information as possible from our visualization. Too much of information will be not good for the project.

(6) Simple Text: Even though simple text is rarely used in terms of visualization, but in our specific projects we would be dealing with a lot of numbers. Since our project is based more on numbers highlighting important numbers is a great option to tell story. However, overuse of this simple tool will lead to loss of its impact so we have to be very cautious.

(7) Providing audience the right information: It will be a problem for us if we ended up leading our audience to focus on a particular feature of our visualization but that is not the information they need. Before creating our visualization product, we need to understand our audience; we need to define exactly what they are looking for. For example, if our audience are technical audience who want to drill down into the analysis or non-technical audience who want to understand the high-level information? Even though this project is a very open sourced project which will be targeting audience of both sets (technical and non-technical) it'll be really important to shape our story and information accordingly and not to dwell too much into other unnecessary information.

Optional Features:

Some of the optional features could include, state election results for all of the years to see if gun violence has any direct correlation with the ruling government in the state. Other feature that could be added can be related to digging more deeply into a particular state data. For example, if we click let's say in California, our visualization will provide summary statistics of all the

shooting that have taken place so far in California including school shootings and others. Now from here if we would like to know more about a particular shooting we can click on that particular city and know more about the shooting statistic in that particular city or school. Model as follow : US => California => San Bernardino => High school shooting 2017 statistics. In simpler words zoom in and zoom out. One more really creative feature could be adding and removing data in the visualization. For example, if we only have to look at shootings that took place in the year 2014 in a particular state, then we can remove all of the data from our visualization from that state apart from the year 2014. These are some of the additional features and information that will be nice to have but is not really that critical as we will only be looking at the country as a whole for most of this project.

Project Schedule: -

This is a proposed project schedule and we will be working together for most of the parts in this project. This schedule is subject to change depending on the availability of the person and varying circumstances, below is the schedule :

04/05/2018 (Thursday): **Project proposal** (**Basic Info, Background and Motivation,Project Objectives, Data, Must-Have Features, and Optional Features.) - Sahil & Rawan**
04/06/2018 (Friday): **Visualization Design, Project Schedule. - Sahil & Rawan**
04/07/2018(Tuesday): **Revised Project Proposal - Sahil & Rawan**
04/10/2018(Wednesday): **Website + Github update - Sahil (Github Update), Rawan (Website)**
04/07/2018(Saturday): **Data Collection and Processing - Sahil & Rawan**
04/20/2018(Friday): **Working Visualizations + Slides - Sahil & Rawan**
05/15/2018(Tuesday) - **Process book (**Will be updated with every update in project) **Sahil & Rawan**
05/10/2018(Thursday): **Complete Visualizations - Sahil & Rawan**
05/11/2018(Friday): **Updated Website with visualizations - Sahil & Rawan**
05/16/2018(Thursday): **Final Version turned in - Sahil**

Related Work:

Here's the link for the sources we found that work in accordance to our project, there were a lot of resources available but we decided to use to show five which correlates with the idea about our project :

(1) An article related to gun violence in Mother Jones magazine
Mother Jones Mother Jones II

(2) Article related to gun violence and homicide in The Guardian

The Guardian

(3) Gun Violence related visualization on Vox
Vox

(4) Gun Violence with relation to gun used, sex and race visualization
Gun crime visualization 2010 & 2013

(5) Analysis on gun death by CDC and Everytown research
CDC research Everytown research