GUN VIOLENCE IN THE USA

ABHISHEK CHANDRAN
abhishek.chandran@utah.edu
uID: u125771

VENKATESH SHARMA
venkatesh.sharma@utah.edu
uID : u1061421

PROJECT REPOSITORY:

https://github.com/abhishekchandran/us_mass_shooting_analysis

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BACKGROUND AND MOTIVATION

Gun violence in the United States results in tens of thousands of deaths and injuries annually. The US has by far the highest number of privately owned guns in the world. It's one of the few countries in which the right to bear arms is constitutionally protected. The primary reason to choosing this project is motivated by mass shooting events that have been taking place regularly for instance an shooting event that took place on the night of October 1, 2017, where a gunman opened fire on a crowd of concertgoers at the Route 91 Harvest music festival on the Las Vegas Strip in Nevada, leaving 58 people dead and 546 injured.

PROJECT OBJECTIVES

The main objective behind the project is to analyze how the proportion of mass shootings in the US has changed across past few decades. This is intended by developing an interactive visualization where the analyst will have the ability to get "detail on demand" stemming from overall view. This project will answer questions like which year wise number of deaths due to firearms? Safest and worst hit states in US and show the relationship between the number of deaths due to gun in a state and how strict are gun laws in that particular state i.e. we are trying to answer if gun laws and no of deaths are related to each other.

We look forward to this project as a learning opportunity where we can grow our skill sets academically and professionally by showcasing the visual design skills with the use of JavaScript and its D3.js library. We would learn about the implementation of best visual encoding techniques. This project will also serve as a platform to use the efficient Data-visualizations and can then be applied to diverse set of Data where one need to make comparison of any event over the years and spread across different geography. Also, this project experience will help us understand better about what type of visualization to choose to convey the insights out of any data set clearly and appropriately.

RELATED WORK:

We decided to take up topic on gun violence in United States after so many of them were being reported frequently. We have been reading about number of people who been dying due to gun violence and controversial debate on gun laws in different states. With multiple data sets available in Kaggle, we decided to go ahead and do some exploratory analysis on data available from 1966 to 2016.

DATA SOURCE

We are collecting mass shooting data from kaggle's datasets and state respective gun law details from statefirearmlaws.org.

[1] https://www.kaggle.com/carlosparadis/stanford-msa/data
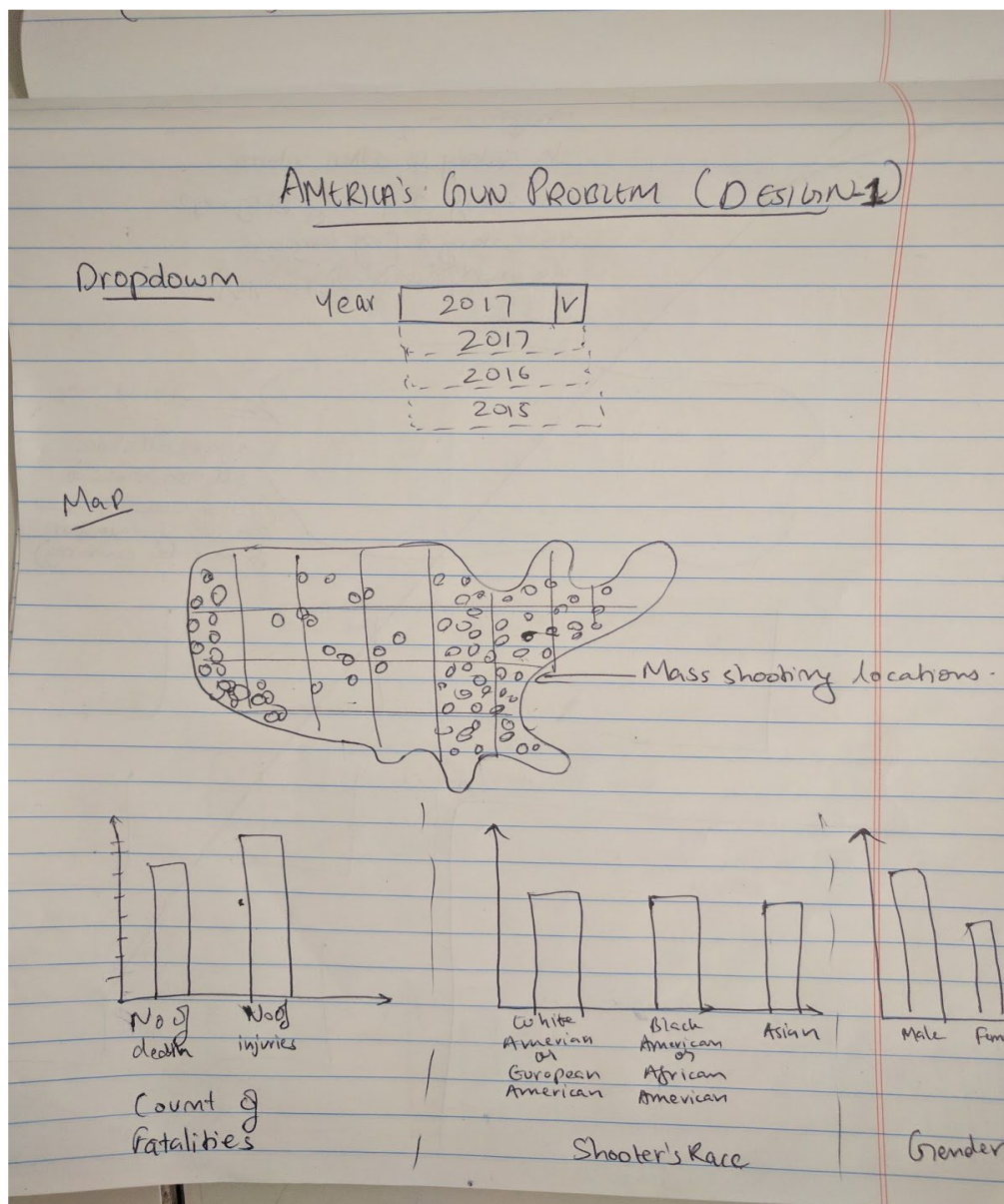
[2] https://www.statefirearmlaws.org/table.html

DATA PROCESSING

The dataset we got from kaggle and state firearms website have all the attributes we would need to implement necessary visualisations.Though we had to segregate and nest it according to our chart, we don't see any particular need to do any kind of data processing.
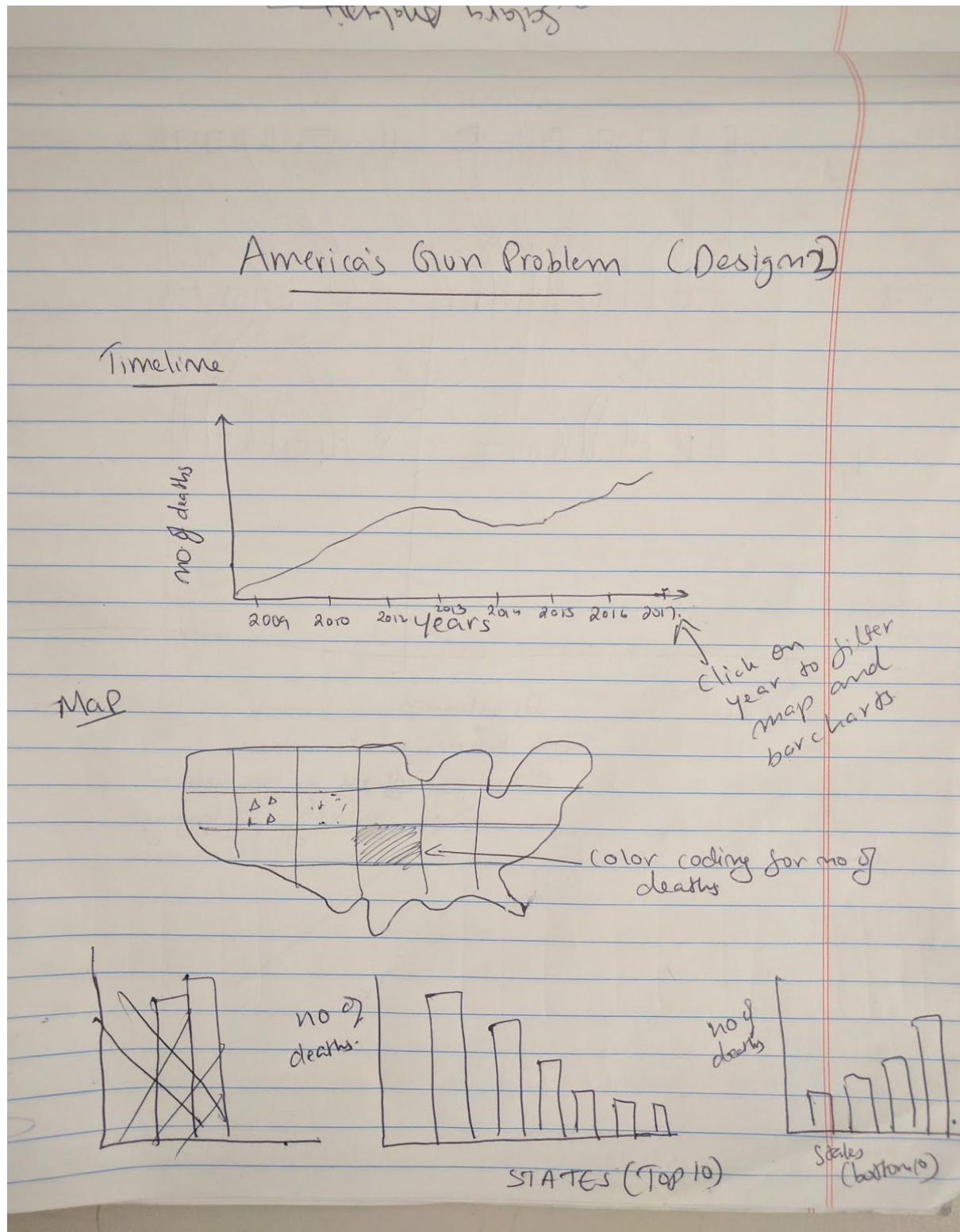
DESIGN EVOLUTION
DESIGN-1

In this design we thought of providing the user a filter option through drop-down, so that he can select the year for which he wants to view different charts. It has a map which shows the density of shooting that have taken place in each location and is represented by circles. Based on year selected through drop-down, three bar charts will be rendered which will show count of fatalities, shooter's race and gender.

DESIGN-2

America's Gun Problem (Design 2)

Timeline

no of deaths / years

2009 2010 2012 2013 2014 2015 2016 2017

Click on year to filter map and bar charts

Map

Color coding for no of deaths

no of deaths

no of deaths

STATES (Top 10)

Scales (button 10)

In our second design, we decided to get rid of the filter through drop-down and show a timeline story showing overall picture over the years, and filtering can be done by clicking on the labels on x-axis i.e. years. We changed the map from previous design to a map that shows color coded states based on number of deaths. We also replaced the attributes of the bar graphs with top ten states and bottom ten states w.r.t number of deaths.
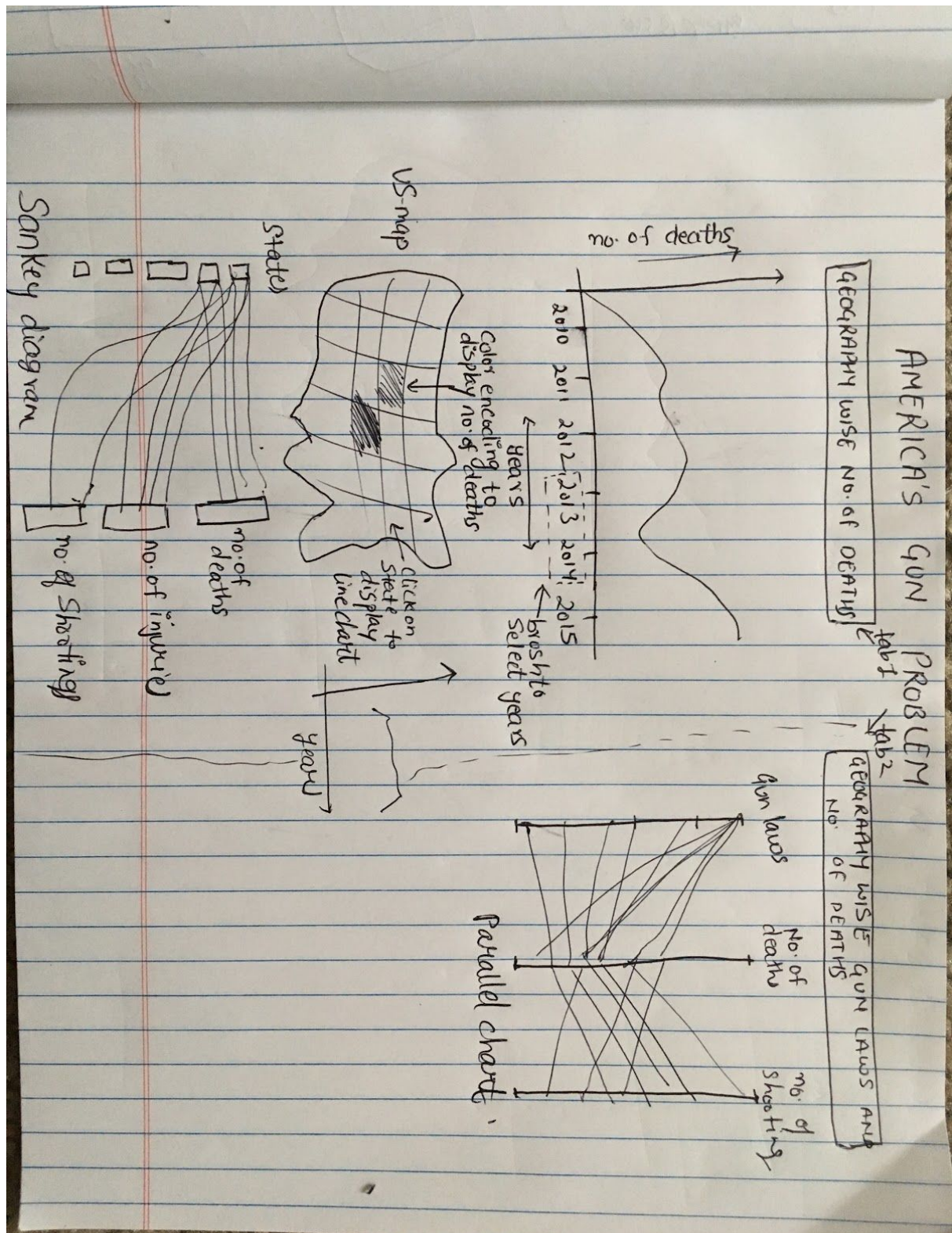
DESIGN-3
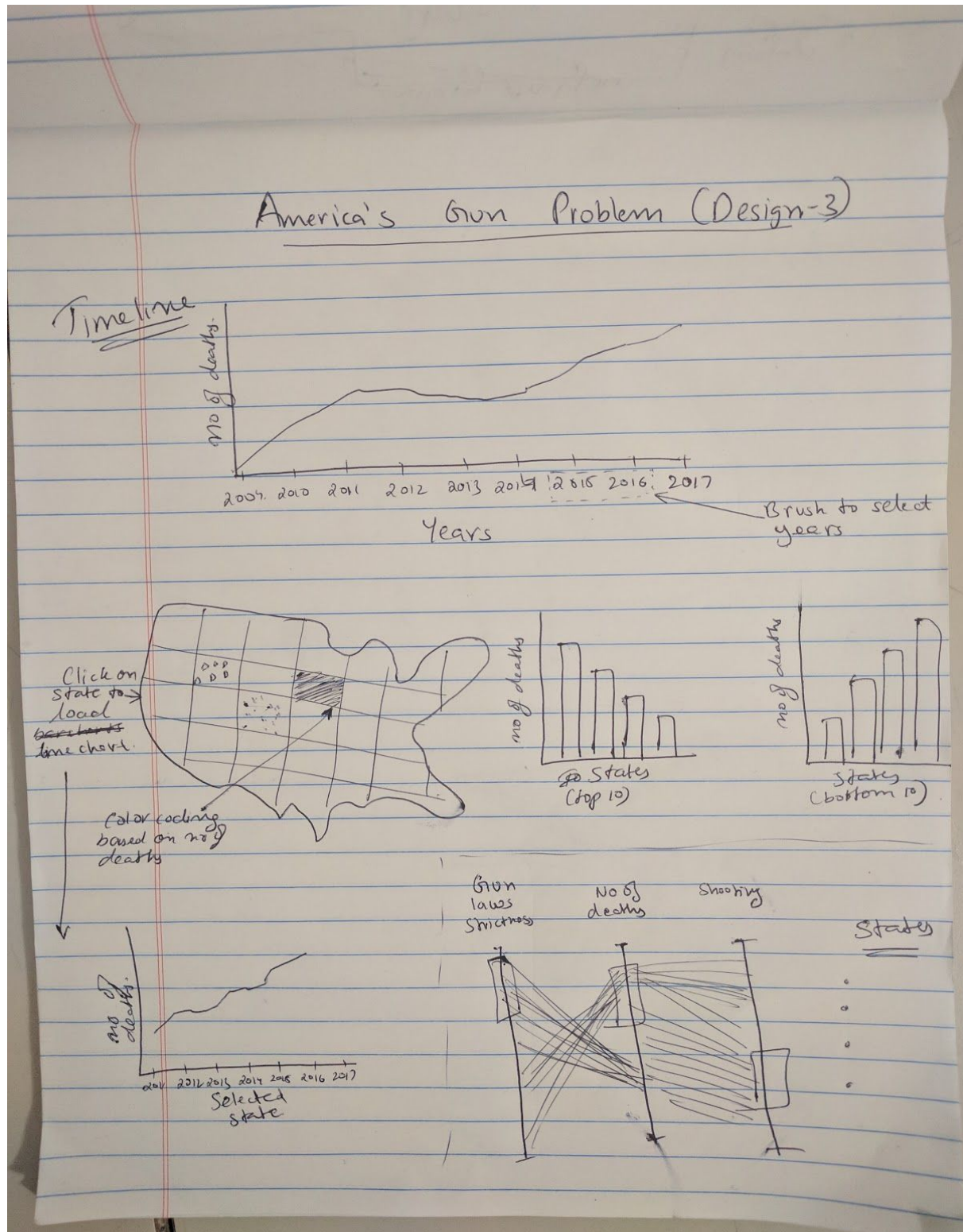
I our third design we have replaced clickable years on timeline with brush selection i.e. now user can select visualisation for multiple years. Clicking on states in map displays a line chart that shows trend in that state over the years. We have added one more chart, parallel chart, which has three columns each depicting gun law strictness, no of deaths and no of shooting, it can used to depict relationship between law strictness in each state and no of deaths.

DESIGN-4
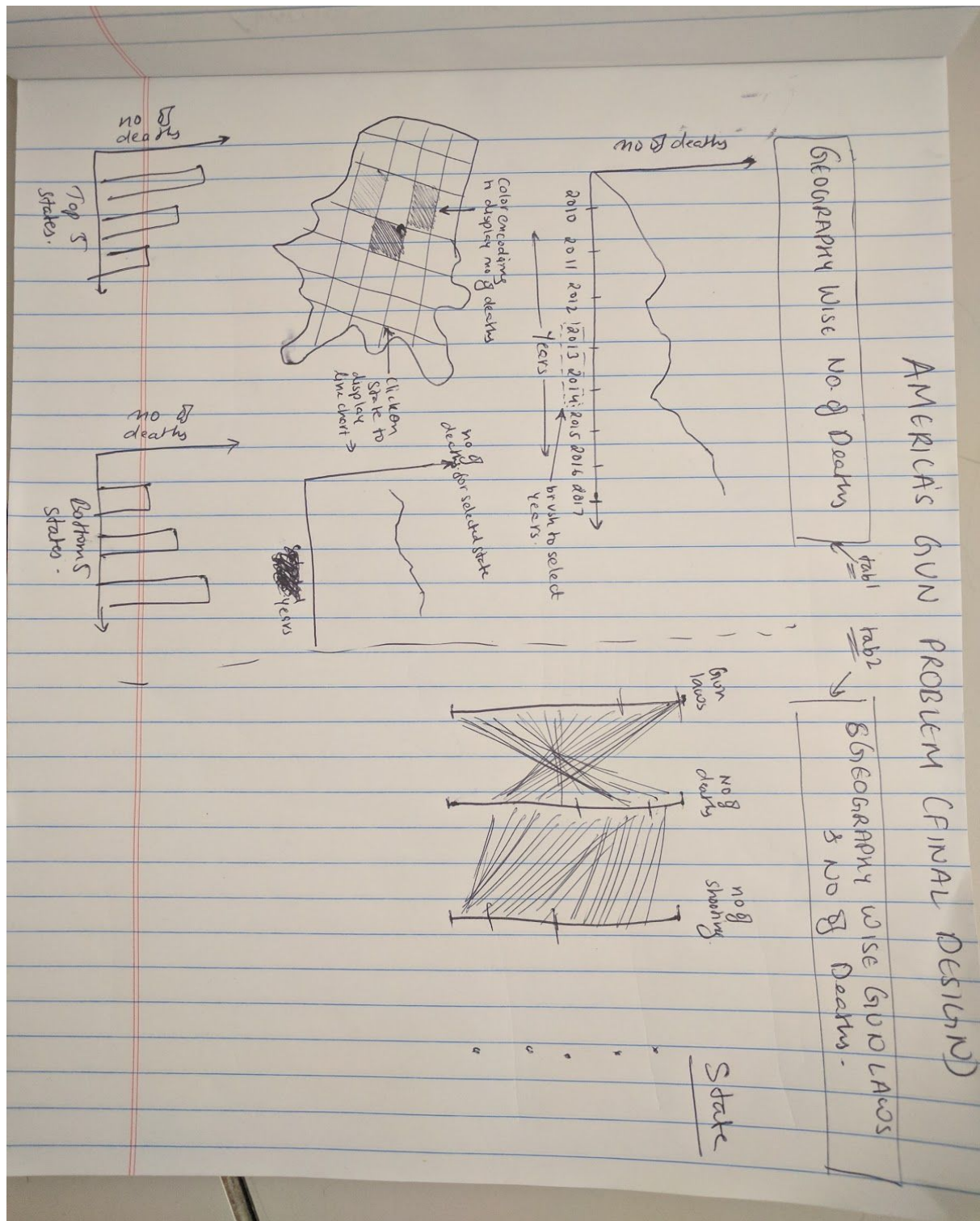
Here we have segregated parallel chart and all other chart into two different tabs, as it gives a more clean view without much cluttering.This is the best taken from all the above designs.

DESIGN-5

This is final design we came up after peer feedback session. Here we have replaced bar charts with sankey graph, where we have state wise number of deaths, number of shootings and number of injured.

MUST HAVE FEATURES:

1) Timeline showing no of deaths over the years, with brush selection for subsequent graphs.
2) Map with states color coded based on intensity of deaths.
3) Line chart showing death trend in selected state over the years.
4) Sankey Graph with number of deaths, shootings and number of injured.
5) Parallel chart showing relationships between state gun laws and no of deaths due to gun and no of shootings.

OPTIONAL FEATURES:

1) On map show intensity of deaths with more precise latitudes and longitudes i.e w.r.t to cities
2) Show country stats in a table that can be sorted on multiple parameters
3) Account for changing gun laws over the years in each state.
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PROJECT SCHEDULE:

Date	Group Member	
	Abhishek	**Venkatesh**
3rd Nov	Timline Graph	US Map
9th Nov	Bar charts	Line chart
17th Nov	Parallel Chart	Brush on all graphs
23th Nov	Highlight cities on map	Show data in table
29th Nov	Create Website	Complete Process Book

QUESTIONS WE ARE TRYING TO ANSWER:

1) What is the trend of deaths due to gun violence in US in past forty years?
2) In a particular year or set of years, which all states in US have been severely affected due to mass shootings w.r.t. number of deaths and injuries.
3) In a particular state, what is trend that has been taking place over the years?
4) What is the difference in magnitude of fatalities due to violence among different states in America? Which are the most affected and least affected states?
5) Do stringent gun laws affect the magnitude of violence?

During initial phase of the project we just trying to find trend over the years in each state, and as we progressed project evolved to a point where we are thought of finding relationship between gun laws and magnitude of violence.

PEER FEEDBACK:

Peer feedback was conducted on 2nd November 2017, Vishal Pandey, Tanveen and Pranav reviewed our project and gave some valuable feedback and raised some valid questions which helped us in improving our visualisations.

Some of the questions that were discussed are:

Q: How are you going to segregate and valid data from multiple data sets?
A: Though all the attributes we need can be found from couple of csv files, we would have to create another file with all segregated data. We have written a python script for that activity.

Q; Is there any other innovative way where you can show magnitude of violence w.r.t. to each state?
A: Earlier we planned to show this data with bar charts, but after discussing this with peers and researching more about the different visualisation techniques we found sankey chart to be apt for representing state wise magnitude.

Q: Does visualization follow principles used in class?
A: We have put in our best effort to follow principles taught in class, like going those visualizations that are more effective in conveying all the information for e.g. visualizing color coded geographies on map, not going for pie charts(due to high number of attributes involved) and sankey charts for analysing the trend.

Q: How are going to make map more interactive?
A: We plan to highlight state on sankey graph when used clicks on a state in the map. We also intend to show summary stats through tooltip on hovering over state in the map.

Q: How will the user select year for which he wants to visualize the data?
A: We plan to implement a brush on timeline chart, where user can select a year/set of years, and map and sankey chart will be updated according to it.

EXPLORATORY DATA ANALYSIS:

In order to visualize the data, we intend to use the following visualization techniques/charts:

Timeline Graph:
We have implemented a timeline graph which shows trend of no of deaths over the years i..e in last 40 years. User will be able to select the year for which he wants to visualize rest of the data through a brush on year's text display.

Map:
We will be using map to show regions which are most affected by gun violence, we intend to convey it through color coding i.e. more intense colors in areas which are most affected. User will be interact by clicking/hovering over the graph. Hovering will show overall stats and clicking will display line a chart which will convey trend over the years in a particular state.

Sankey Graph:

We intend to use sankey graph to show magnitude of deaths, shooting and number of injured w.r.t each state. It will show an overall picture of all states with more defined magnitude.

Parallel Coordinates Graph:

We have implemented a parallel coordinate graph to visualize relationship between state gun laws, no of shootings and no of deaths. We intend to learn if stringent state laws affects the violence due to gun. Brush has been implemented to select range of magnitudes.