Modern Gun Violence Trends in the U.S.

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Overview and Motivation

Our goal is to create a visualizer for gun violence that makes it easy for people to filter through and explore all the incidents of gun violence over the past several years. This should help dispel any misconceptions they may have on the modern state of gun violence and hopefully be informative.

Since it seems that gun violence is on the rise we felt it would be both personally interesting and illuminating to anyone else who shares a similar interest to create a visualizer to easily explore this data in a comparative way.

Related Work

There are numerous articles and visualizations covering similar topics however the inspiration for our work was access to the dataset itself which we will cover later.

Questions

With our site we're looking to show how different aspects of gun violence such as the number of deaths or location may change over time. Since rates of violence differ greatly between male and female perpetrators we had hoped to show a percentage difference for each state however we decided to change that after discovering that much of our data didn't include that information.

We also want to allow people to drill down and answer and questions they have about this data themselves so we created easy filtering tools and included a way to access the news source and the information from gunviolencearchive.org

Data

We decided to use an aggregate data set from the Gun Violence Archive. In order to get this data ready for the visualization we needed to preprocess it using python so it could be easily manipulated in the DOM. We found after working with the data that there were some problems for the year 2013 so we are omitting it from our visualization and will only be showing data from 2014 to 2018 inclusive. To contextualize and normalize this data across the country we will be showing numbers on a per capita basis using the US census data for population.

Exploratory Data Analysis

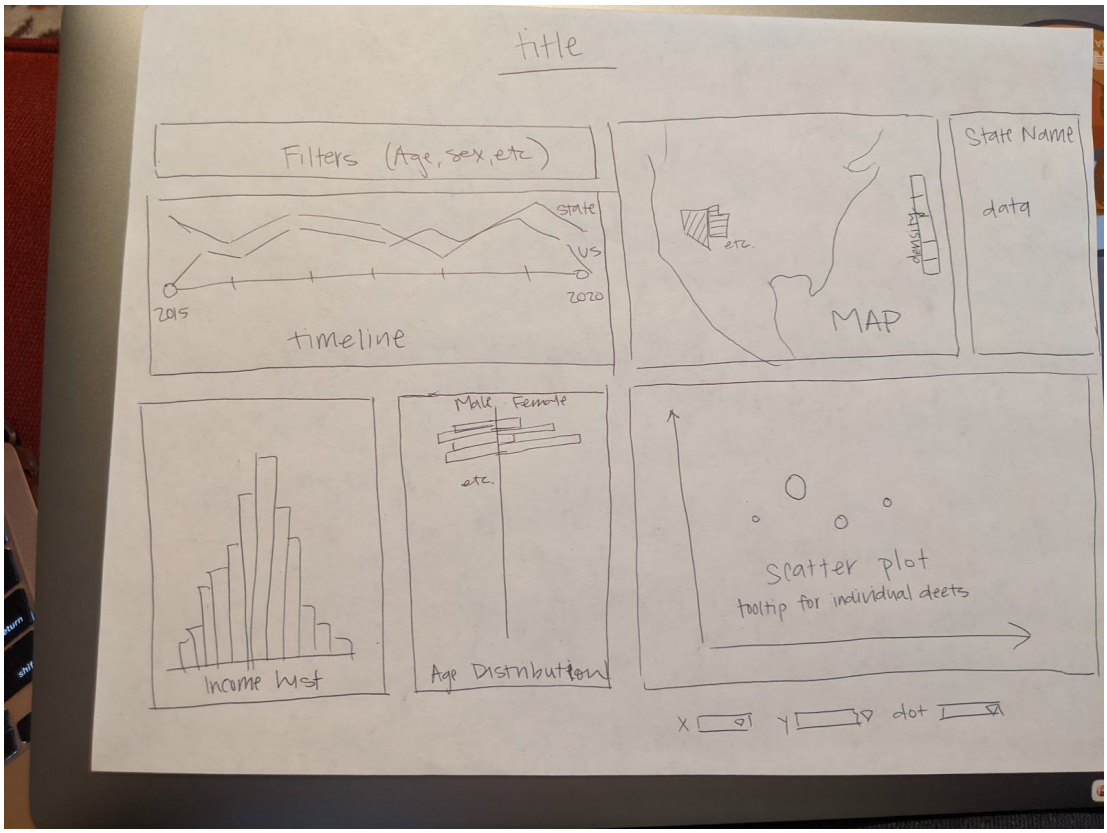
The data shape and type was fairly obvious based on the description and attribute list of the data from our source. After reading through that we moved on to designing the visualization to allow the user to easily see how these attributes interact.

In our data set each data point is a single gun violence event which contains the date, location, number of deaths, and number of injuries among other things. After looking at this we decided to contextualize this data against the US census

Design Evolution

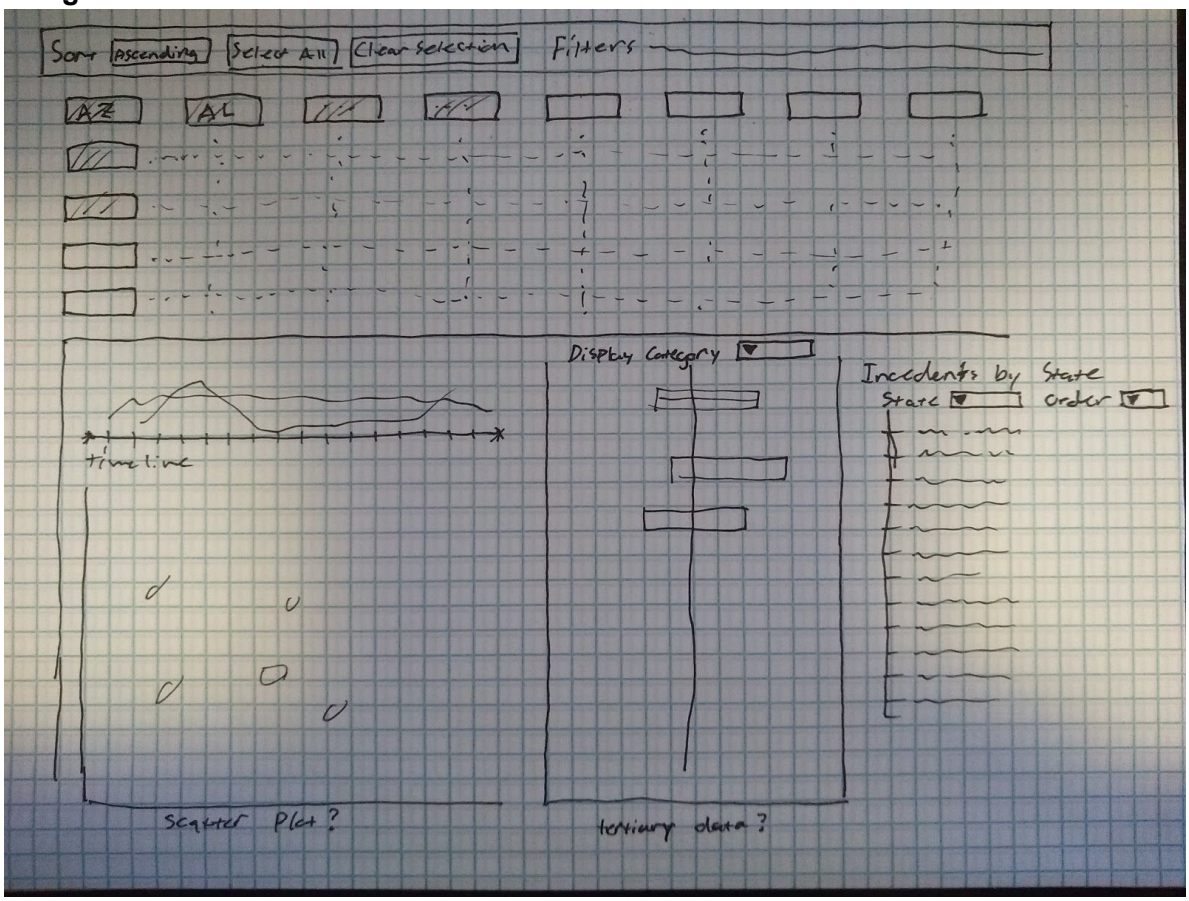
After looking at our data we moved through a quick iteration process to find a visualization that we thought would show the characteristics of the data and be easily navigable by the user.

Design 1



Our first design was mostly for exploration, from the beginning we were thought we were going to go with a country map for ease of selection. The timeline also seemed like an obvious choice since change over time was an important feature to show.

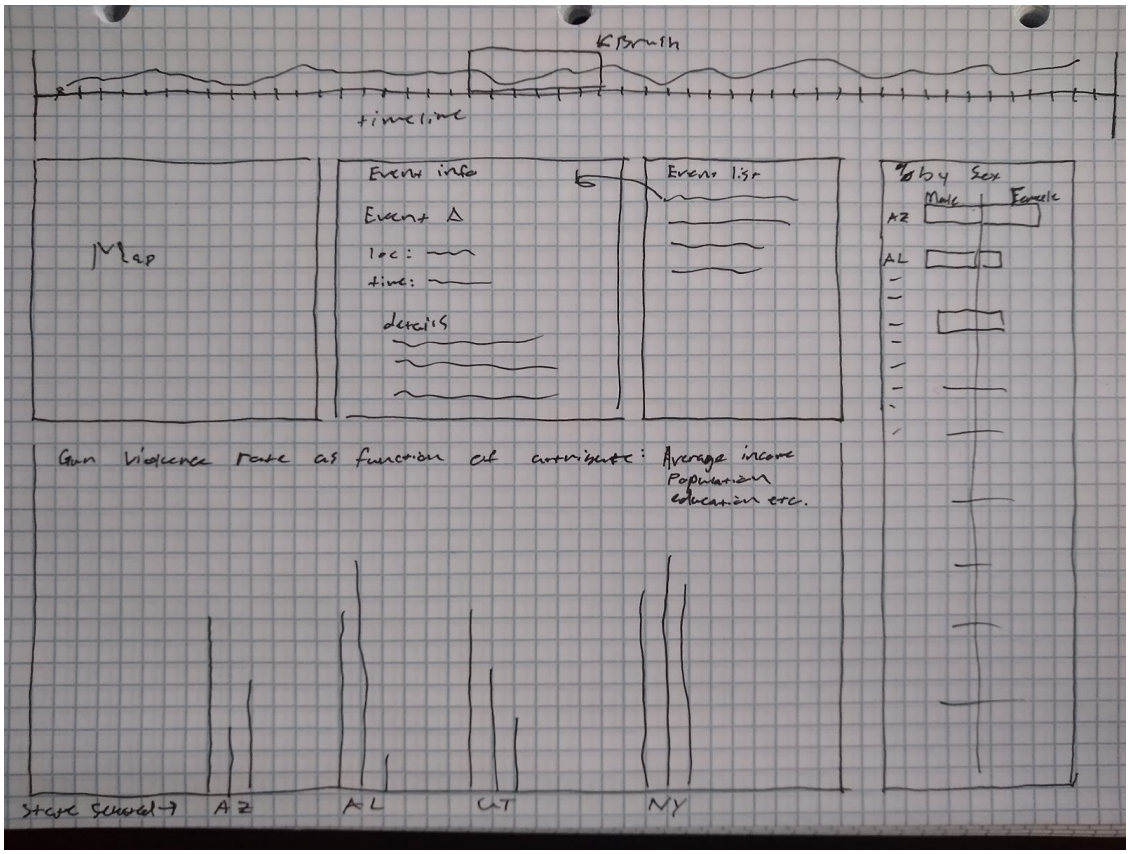
Design 2



With this design we were playing with the idea of removing the map for selection and creating a way to visualize data for each state in this list of 50 buttons that would fill based on their rate of the specified filter, kind of like a bar chart. This order could be changed to alphabetical or based on the highest rate of say deaths to population.

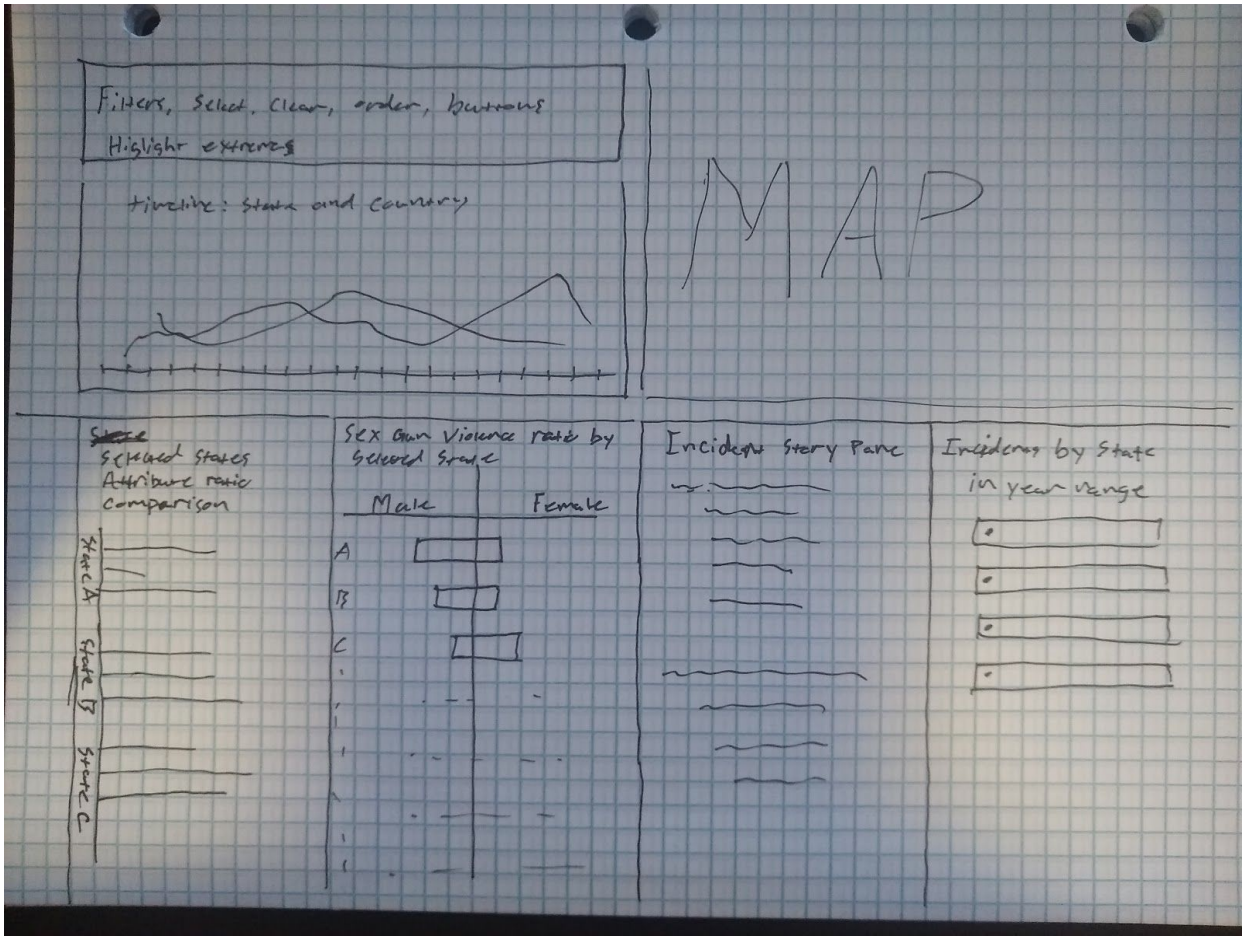
We also introduced the idea of the incident pane in the bottom right for more specific detail about any given event

Design 3



The third design was also an attempt to throw out ideas to see if there were any interesting visualization techniques that would come out of it. We decided that most of the differences between this and the other visualizations weren't good except for the comparative bar chart in the bottom left. This would allow a larger view of all the user selected states compared against each other.

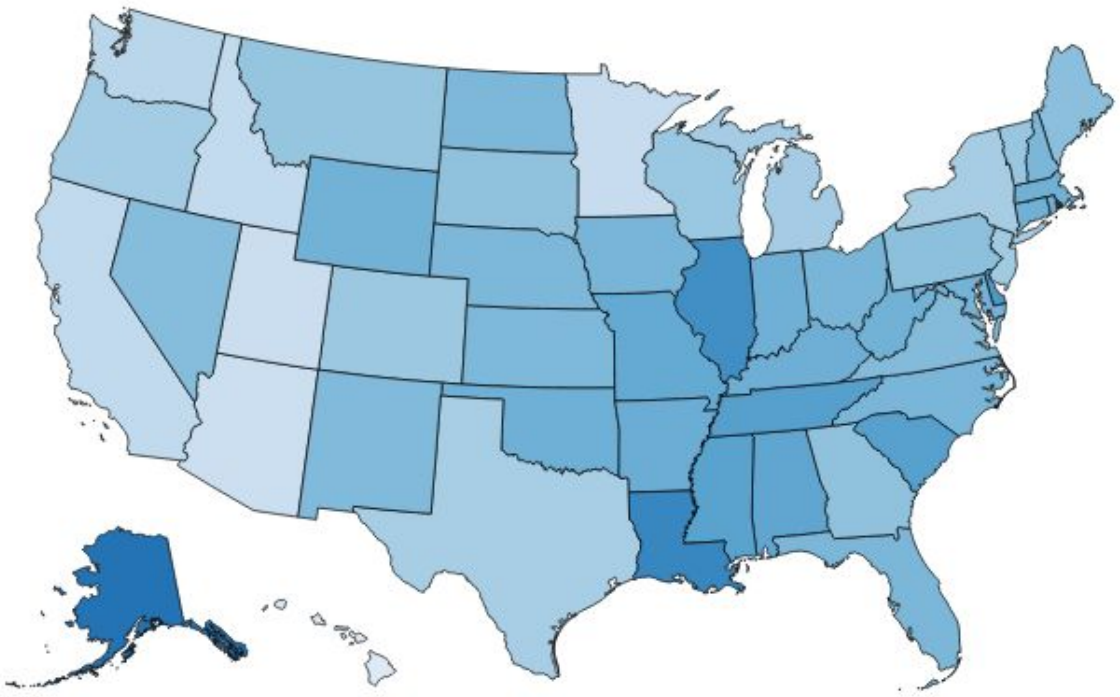
Final Design



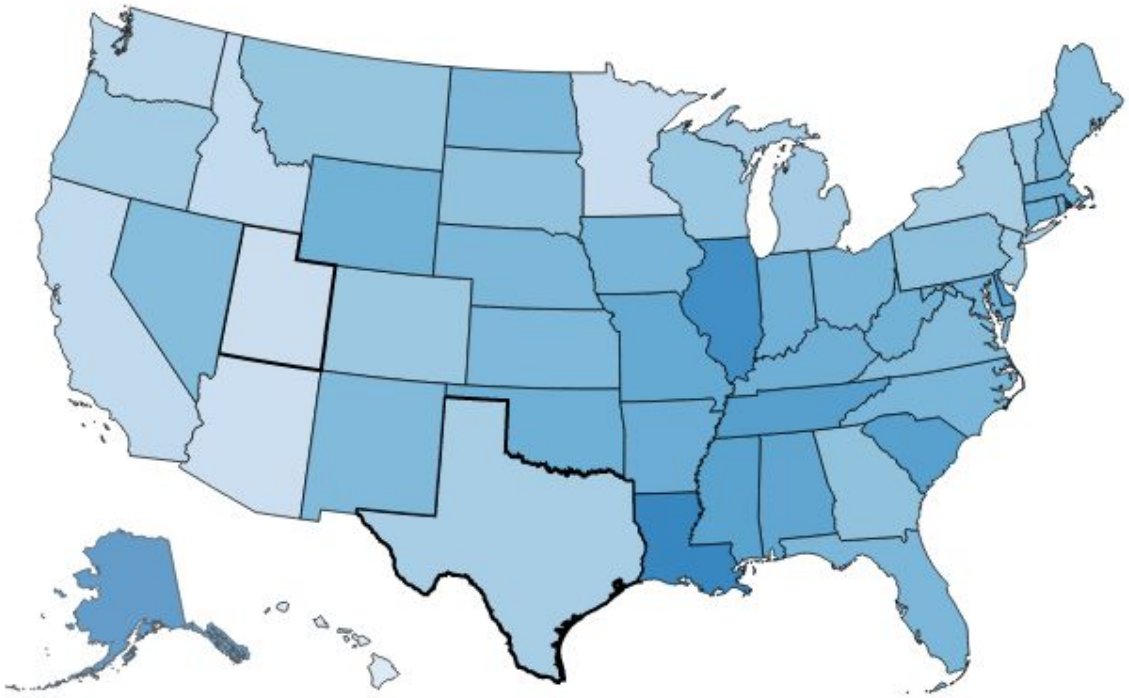
The final design we came up with blended all of our best ideas with the map selection, the timeline and filtering methods in the top left, the incident list and detail pane in the bottom right along with a modified bar chart on the bottom left. The only element that we ended up changing in the final version was the by gender view as our data wouldn't allow that view in any meaningful capacity.

Implementation

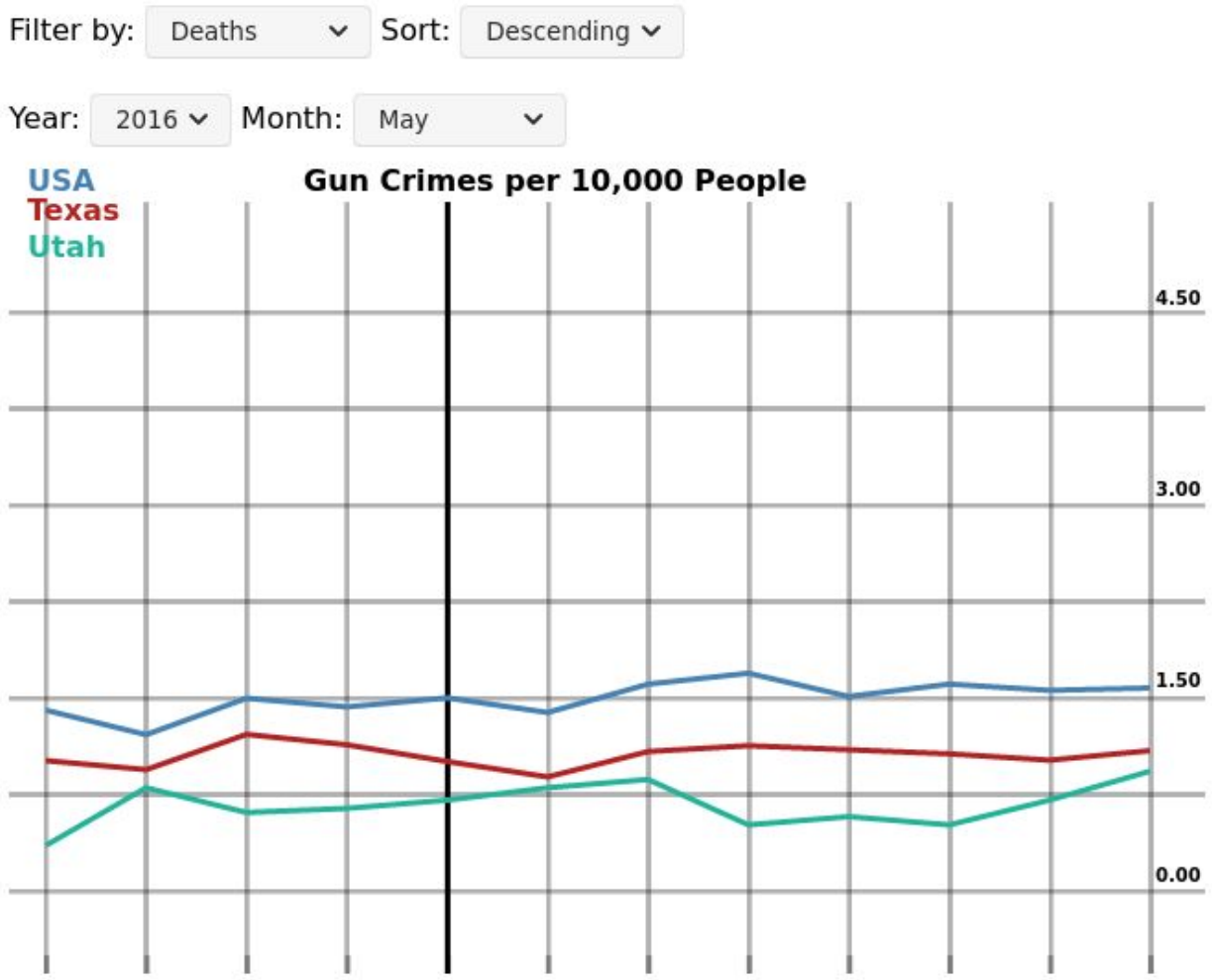
Our visualization is essentially divided into 4 views, A county map, timeline, incident info, and a comparison view. Our map allows the user to select up to 5 states at once as more than 5 and there is too much information to easily parse. The selection of states can be cleared by selecting an already selected state or selecting more than 5 states. The selected states details are shown in the other views. The color value indicates a per capita incident rate for the selected year in the timeline view. Below is an example of an unselected view



And an example of the same year where both Texas and Utah are selected



The timeline view shows all the states' incident rate of gun violence in terms of number of cases per 10,000 people in that state. We chose to show the data in that way since we felt a rate of in the ten thousandths wouldn't convey much meaning to the user. States are color coded in the order they are selected in the above map for clarity.



Above the timeline is a range of filtering selections that affect both the timeline view and the other views allowing the user to see the data from different perspectives. Here May is selected and highlighted in the chart to make reading easier.

The incident list and incident pane respond to the sorting and filtering in the timeline and shows a comprehensive list of all the events that match up with the selected filters for the given states. Once an event is selected. Specific details of that event are shown on the left and the user can access the news story about the incident and the archive report of the incident by clicking the two available buttons. Here the color coding matches the order selected and the green incident's information is shown on the left.

The remaining bar and bubble charts show a comparative view of the selected states and the biggest events of the year for all states.

Evaluation

Interestingly we found out over the course of building our visualization that places normally associated with high gun violence like California or New York are actually fairly low on a per capita basis. And some states that don't often come up in the gun violence discussion can actually be quite high like Louisiana and alaska. Another interesting phenomena is that some states seem to have huge spikes of gun violence in the middle of the summer like Alaska and Wyoming.

The visualization we sought to create does function in the way we had hoped. It's easy to filter large amounts of data quickly to reveal trends and to also dig into specific details on these cases. The visualization could be further improved if we were able to collect socioeconomic data as a demographics position on that scale can have effects on rate of violence.