Motivation

In the wake of the Parkland Florida school shooting, gun control has been at the forefront of the media. A plethora of articles highlight the danger of guns, focusing on death counts and victims, and while these numbers are strong motivators for increasing gun control strictness, they are likely not the drivers behind what measures ultimately get put in place. For instance, Florida recently passed a new gun bill, raising the minimum firearm purchase age from 18 to 21 for both rifles/shotguns and handguns—while there is most likely sound reasoning behind this change, I have not seen any data indicating that 18 to 21-year-olds are responsible for a substantial proportion of gun deaths. In light of this discrepancy, I wanted to create a visualization based upon shooter information, as opposed to victims, to explore how well new gun laws address historical patterns in gun violence.

Goal

The goal of this visualization is to: (1) show how stricter minimum ages to purchase firearms impacts the age of shooters, and (2) how dangerous different shooter age groups are. I decided to focus on shooter ages, as I am curious how effective increasing the minimum purchase age will be in Florida.

Article

The original article can be found here: https://www.nytimes.com/2018/03/08/us/florida-gun-bill.html. The article with the visualization embedded can be found here: https://djvkn7.github.io/gun_violence/.

Data

I used the Gun Violence Archive (http://www.gunviolencearchive.org/reports), a non-profit corporation that collects, verifies, and disseminates gun-related violence information in the United States. Unlike other data sources, the Gun Violence Archive provides detailed information on each incident, including shooter age. Given the website construction, I used ParseHub to scrape the date, state, number killed, number injured, and shooter age for each incident.

To determine the effectiveness of increasing the minimum purchase age of firearms, it is necessary to compare the gun-related death/injury rates among states with varying degrees of minimum purchase age strictness. Using Gifford's Law Center (http://lawcenter.giffords.org/gun-laws/policy-areas/who-can-have-a-gun/minimum-age/) I found three distinct minimum purchase age segments: Federal, stricter-than-Federal rifle/shotgun, and stricter-than-Federal rifle/shotgun and handgun.

Finally, to normalize the deaths and injuries between these segments, I used state populations as of 2018 (http://worldpopulationreview.com/states/) to report total deaths and injuries on a per capita basis, rather than in absolute terms.

To create the sunburst visualization, my data had to in hierarchical format: each section of each ring needed a list of children, except the last ring which had the per capita numbers. This script is included in orderedData.py, and was used to produce heirarchicalData.json. I only included data that occurred after December 11th, 2017, as that was the cutoff date for which all of the scraped records still provided data. I also removed entries where the shooter age was not present. With the data cleaned, I then filtered data into the appropriate location in the hierarchy, filtering the following order: law strictness, shooter age, victim outcome, and intent. Each number was then divided by the total population of states for which that law strictness applied.

Visualization Design

I elected to use a sunburst for three main reasons: (1) it maintains a continuous, wholistic view of the data, (2) inter- and intra-level comparisons are easy, and (3) it facilitates interactions that enable effective storytelling.

The visualization intentionally starts out broadly, with the center of the sunburst providing necessary context going forward: the Federal minimum age to purchase firearms. Navigating outward, the center information changes according to the hovered-over node, showing the percentage of the parent the current node accounts for and additional details about that section. As the viewer moves the mouse, trailing highlighting illuminates the path from the root to the current node, providing the viewer with a strong frame of reference for where they are within the entire visualization. Beyond maintaining scope, trailing highlighting also guides the user through a story of gun violence, starting at the Federal level and getting increasingly more focused, going all the way to the intent of the shooter; the phrasing of the center information and the trailing highlighting create an obvious, clear, and logical sequence for viewers to follow.

To ease the inter- and intra-level comparisons, users can click on a node, which highlights both all the nodes descendants and intra-level nodes of the same color/dimension. This selection of highlighted nodes is maintained, overriding the trailing highlighting, until the user either clicks out of the sunburst or clicks the initially selected node again; hovering over a node will highlight it (unless it is already highlighted from before), and update the center contents to reflect its percentage and additional details. This interaction allows users to easily highlight subsets of the sunburst and simplifies node comparisons as directly comparable nodes are highlighted. Additionally, clicked nodes are likely of interest to the user, so maintaining its full opacity while the user explores comparison nodes eases visual comparison.

Finally, to reduce the strain on users working memory, each ring is a color gradient, with lighter colors corresponding to younger individuals and less severe laws, outcomes, and intent, and darker colors corresponding to older individuals and more severe laws, outcomes, and intent. Thus, although there are ten unique variables, the common implementation of color gradients to represent ascending data will aid in recall and encoding. Leveraging the intuitiveness of the color gradient encoding and to incentive users to engage with the visualization, the legend is intentionally vague—preliminary data exploration should be sufficient for users to effectively understand the color encoding.

Placement

The visualization is placed directly after the section of the article discussing raising the minimum age requirement so that viewers have both sufficient prior context before interacting with the visualization, and are motivated to interact with it.