Unmasking the Epidemic: Analyzing the Complex Factors Behind Gun Violence in the United States

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Section 1: Why and How

In just the past decade, the United States has witnessed a disturbing increase in the frequency of acts of gun violence. Sadly, one group that gets severely affected by this is schoolchildren. Any sort of traumatic experience can have long-lasting negative psychological effects on a child's developing brain; there doesn't have to be a death for an experience to be categorically traumatic for a child. Many Band-Aid solutions have arisen as a result of this severe uptick in incidents, however, none aim for the head of the beast for various reasons. Our project, outlined below, aims to thoroughly analyze data collected in the K-12 School Shooting Database (k12ssdb.org). The data collected here details all shootings at schools. "All shootings at schools includes when a gun is brandished, is fired, or a bullet hits school property for any reason, regardless of the number of victims, time, or day of the week… (and the collected data also includes) gang shootings, domestic violence, shootings at sports games and afterhours school events, suicides, fights that escalate into shootings, and accidents" (k12ssdb.org).

We intend to visualize the distribution of gun violence across the US over time. The K12SSD has been kept up to date, and provides data for every recorded instance of gun violence in schools from 1966 to the present day. The visualizations will show how gun violence has been present in the various regions in the US, along with each region's poverty rate. We would like to see if there is any correlation present. Above all, we'd like to show as much regional data as possible, specifically county specific information, so that we can have an effective drill-down.

Section 2: Design

We have designed 3 sections of visualizations, detailed below:

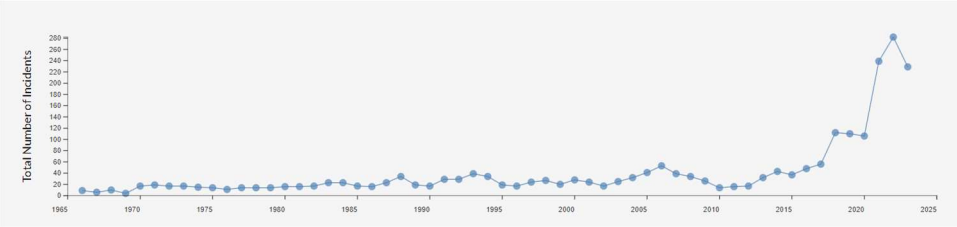

Fig 1, Time Series Line Graph

This visualizes the total number of incidents that occurred from 1966 to 2023. Each point on the line refers to a specific year, and shows the trend of gun violence throughout the years. This visualization is purely meant to show the alarming increase in incidents in recent years.

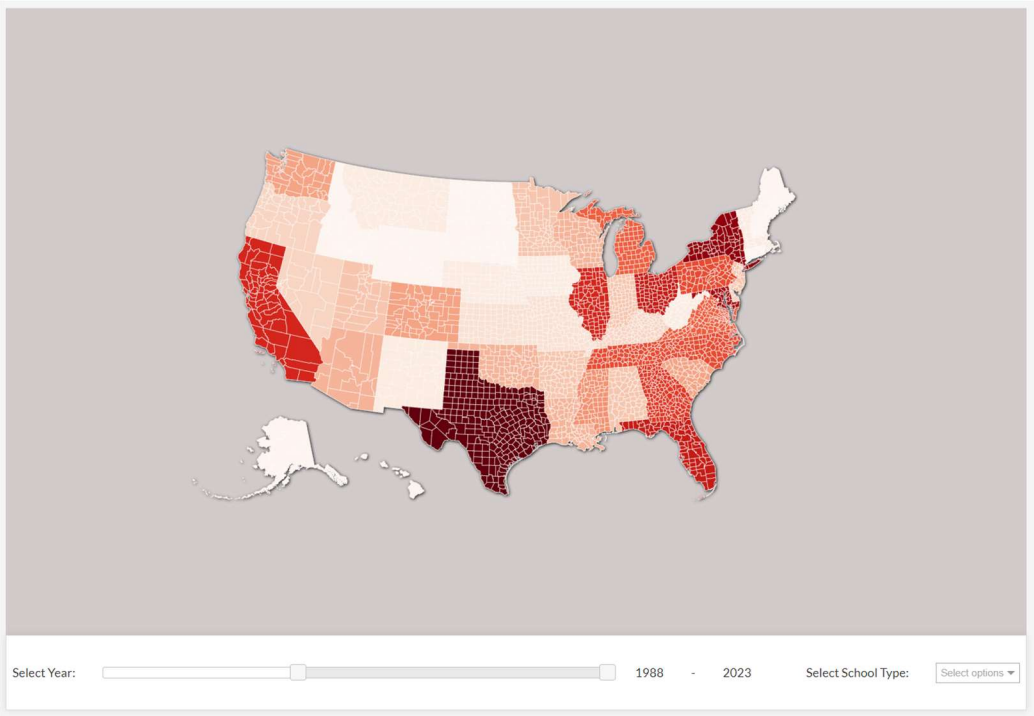

Fig 2, Interactive Choropleth Map

This visualizes the data related to school shootings, poverty percentage, and educational information at the state and county levels in the United States. The map is implemented using an SVG container with features like zooming and tooltip interactions. The map is dynamically updated based on selected filters, including years and school types. The data, consisting of GeoJSON information for U.S. states and a CSV file with details on school shootings and poverty percentages, is loaded asynchronously. The choropleth colors represent the number of shootings in each state, with tooltips displaying additional information such as poverty percentage. The code includes functions for handling mouse events, semantic zooming, and double-clicking to zoom out. Zooming in shows county-level information as opposed to state information while zoomed out.

Filters, including a year range slider and a dropdown for school types, enable users to explore the data interactively. The map is initially populated with default filters on page load, and users can adjust filters to explore specific subsets of the data.

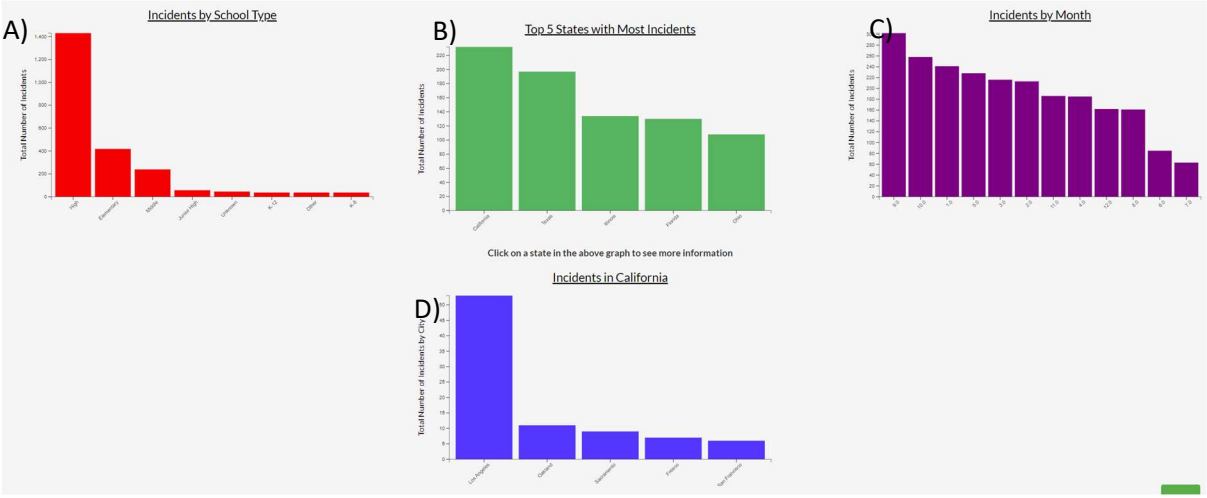

Fig 3, Bar Charts

The final section of the webpage has 4 bar chart visualizations in separate SVG containers, showing the types of school where the shooting incidents happened (fig 3A), the top 5 states where the incidents occurred (fig 3B), incidents distributed across the months when they occurred (fig 3C), and the 5 cities with the most incidents in a selected region (fig 3D). All four of these graphs show data for the year range selected by the user. Clicking on a corresponding state's bar in the top 5 states graph (fig 3B) allows you to update the region in which the cities bar graph (fig 3D) pulls its data from. These charts also incorporate tooltips for additional, detailed information, creating an immersive user interface.

Section 3: Discussion

We were able to effectively visualize how gun violence is distributed across the country, and we can begin to draw conclusions regarding shooting counts and socioeconomic status. Due to time constraints and a lack of data availability, we had to pare down the scope of the project significantly. The original project proposal included filtering for a variety of different factors that may have had an impact on gun violence. These included resources available for mental health, political lean, and racial demographics. While these filters would not be difficult to implement, sourcing accurate data, for example with mental health statistics, proved to be an issue. We also did not want to draw any sort of conclusions that have the potential to harm or offend any user, so for the scope of this project, we chose not to include the other two potentially polarizing filters. However, given more time, we would implement these filters as they provide valuable insights on potential correlations. Finding any additional correlations with these extra filters would allow us to actually o formulate targeted interventions and policies to make schools safer for all students and educators.