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DATA VISUALIZATION, SPRING 2018

INDIVIDUAL PROJECT PROBLEM STATEMENT

1. **What does the literature tell you about the topic?**

The literature, written by German Lopez, talks about Gun Violence in the USA. The problem is explained with 17 maps and charts. The literature tries to explain what the violence looks like compared to the rest of the world, the reasons that this violence occurs, and why is it so tough to find a solution to this issue. At the beginning of the literature, there is a 7 minute video which summarizes almost everything that is mentioned as text in the literature.

A brief summary about the topic that the literature explains is as follows:

➢ The literature begins by comparing the firearm homicides rate of America with Canada and Germany. The author states that compared to other developed countries of the world, America leads in gun-related homicides. The reason for this is simply because the USA has far more guns than other developed countries. America has almost half of the world's civilian-owned guns.

➢ America is not on the top of the list of countries when it comes to crime in general. It is an outlier only when it comes to gun violence. Compared to London, a study shows that property crimes in New York are 54 times more deadly, asserting to the fact that more guns do lead to more deaths.

➢ The article states that after the Sandy Hook Elementary school shooting in Dec 2012, there have been more than 1600 mass shootings. The definition for mass shooting used here includes shootings in which, excluding the shooter, 4 or more people were murdered or were shot at. On an average, there is one mass shooting in USA every day. However, there is a high chance that this data is missing some data-points, as there are a number of shootings that go unreported.

➢ States with more guns have more gun deaths, including homicides and suicides. This is true for both USA as well as the other developed countries in the world.

➢ States with tighter gun control laws have fewer deaths. This shows that restricting access to guns does reduce crimes and hence, saves lives.

➢ In states with more guns, police officers expect more gun and deadly violence, which results in an increased number of cops killing people. In addition to that, in states with more guns, more cops have died on duty too.

➢ The article then talks about how most gun deaths are suicides. As the video in the beginning of the article emphasizes,

"A depressed person with a gun is far more dangerous than a depressed person without a gun."

This statement is supported by the fact that Australia's gun buyback program and a study by Israeli researchers. Australia's policy saw a drop in firearm homicides by 50%, and a drop in gun suicides by 74%. Similarly, Israeli researchers found that when the military stopped letting its soldiers take their guns over the weekend, the suicides among soldiers dropped by 40%. This goes on to show that restricting access to guns reduces gun violence.

➢ The article then talks about Gun control policies and people's views on it. Since the early 2000s, the support for gun ownership has increased sharply, and the public support towards "Protect civilians' right to own guns" has increased too, despite multiple high profile killings in the last couple of years. Even though most Americans wish to protect the right to own guns, they also back certain gun control proposals. Specific gun control policies are fairly popular, though many oppose the policy as a whole.

2. **Where and why is the data product (in)effective?**

The data product is *effective* in the following ways:
➢ It gives and extensive idea about the gun violence issue in the USA.
➢ Not only does this data product give an idea about the situation in USA, it also compares this situation with the other countries of the world. This gives a comprehensive idea about how good/bad the gun violence is in the USA.
➢ The video manages to give a crisp summary of what the entire article explains.
➢ The graphs are visually pleasing, clear and informative.

The data product is *ineffective* in the following ways:
➢ There are different graphs for each point. It is not possible to use only 1 type of graph/visualization for all the 17 points that this article covers, but it would have been more captivating and homogenous had there been only a few types of graphs.
➢ In (2), it is hard to understand the split comparison, and in this case a line graph or a similar visualization would have been better for direct comparison.
➢ Some data is missing, which can lead to slightly misleading results.
➢ In (3), the tracker uses a fairly broad definition of mass shooting and it would be interesting to see the results in case a different definition of the same would have been used.
➢ In (5), the axis compares percentage of adults versus number of residents. The visualization would have been more effective if both the axis had a homogeneous point of comparison.

3. **What is your proposal to redesign the data product?**

In case of redesigning, I would propose the following changes in the data product:

➤ First, I would divide the entire article in the following 4 sections:
- What is the Problem?
- Why is it a problem?
- What is the solution?
- Why is it a good solution?

➤ I would then divide the entire data product content under these sections and do the following :
- The data product contains some unnecessary and redundant texts, like in point (12), which do not add to the purpose of the data product and can be removed.
- There are some points, like points (11) and (5), which seem to overlap with each other and convey almost the same meaning. These points can be merged to bring a cohesive output, which is not repetitive.
- Graphs could be as homogenous as possible.
- Though the article is very informative, it is very long. The length of the article can be reduced by removing the above mentioned redundant and repetitive points. The data product needs to be long enough to be interesting and to convey all the information, yet short enough to not become dull and monotonous.

4. **What are potential starting points for a deceptive version and why are they deceptive?**

There are a few starting points for deceptive versions and they are as follows[1][2][3]:

➤ Interchanging X and Y axis: Normally, it is common to have the X axis on the left hand side of the graph, and the Y axis on the bottom. Reversing this can lead to deception and misinterpretation of the graph, as it can be seen in the example provided in footnote 1.

➤ Truncating the axis: As seen from the footnotes 1 and 3, the data visualization can become deceptive when we change the range on any of the axis. This will lead to either a hyper or an under-statement.

➤ Showing cumulative data: This technique is deceptive as it can give a wrong idea about growth when shown as a cumulative data rather than weekly, monthly, quarterly, etc. An example is given in the footnote 1.

➤ Violating Mathematical Conventions or standard rules: Pie chart divisions not adding to 100, X and Y axis being inverted, etc. can lead to wrong interpretations of the visualizations.

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[1] https://heapanalytics.com/blog/data-stories/how-to-lie-with-data-visualization
[2] http://www.businessinsider.com/gun-deaths-in-florida-increased-with-stand-your-ground-2014-2
[3] https://medium.com/@Infogram/study-asks-how-deceptive-are-deceptive-visualizations-8ff52fd81239

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5. **Have you obtained access to the mentioned data sources or identified replacements/potentially important additions?**

Some of the data provided in the article is available as it is open to public, while some of the results are taken from other articles that are linked in the literature. Like all data, it is always possible to improve the analysis by getting more data.

According to me, there are multiple factors that lead to gun violence. Some of them are: poverty/ household income, unemployment, drug use, alcohol abuse, education level, age, gender, etc.[4567 8]

Potentially important additions can include data that not only covers gun violence, but also that that can show the relation between gun violence and the above mentioned factors.

One of the data that could be useful for the above mentioned addition is https://www.kaggle.com/jboysen/state-firearms/data .

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[4] https://htttps://www.sciencedirect.com/science/article/pii/S1359178917300654
[5] https://academic.oup.com/epirev/article/38/1/46/2754869
[6] https://www.statista.com/statistics/623453/gun-ownership-in-the-us-by-gender/
[7] https://www.statista.com/statistics/623418/gun-ownership-in-the-us-by-education-level/
[8] https://www.statista.com/statistics/623409/gun-ownership-in-the-us-by-age/