Interactive Media Design CA 1

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# **CA Summary**

This goal of this CA is to provide visualisations regarding various violent crime statistics in the United States for recent years. An area in which this CA aims to provide some level of insight into, is violent crime over time and current trends. In order to achieve this goal, this CA will warrant the use of crime statistics over a number of years in order to demonstrate change and current trends. This CA will also highlight crime as it pertains to different states of the Contiguous United States, for which data showing crime statistics as they relate to specific states will have to be utilized.

Currently Gun Control and Race Equality are large concerns in the United States, for this reason this CA will highlight these concerns as they relate to Violent Crime. The CA will attempt to highlight different weapons types and the frequency with which they are used to commit crimes. It will also look at Violent Crime in relation to race by examining the rate at which crimes are committed by each race and the rate at which each race is a victim of violent crime.

These visualisations will ideally clear up misconceptions and provide an accurate insights into Crime in the US. Through these insights this CA is intended to provide a broader understanding of Violent Crime and the demographics surrounding it.

# **Background**

Violent Crime in the United States has been a very contentious issue over the last decade, according to Forbes mass shootings have been on sharply rising over the last decade, as of the 18th of October 2015 there have been 305 mass shootings in the US.

While this CA takes a much broader approach to Violent Crime than Mass Shootings, they are a globally publicised event, for this reason I felt a look at Crime in the United States would be a very interesting subject to study and attempt to visualise.

When considering this topic over others, I was heavily influenced by the impressive collection of statistics made available to the public by the FBI through FBI.gov. These statistics cover a wide range of topics relating to crime, such as crime by State, County, City etc. as well as crime by different demographics such as race, gender, sexual orientation, religion and more. Interestingly, the statistics provided by the FBI do not just numbers regarding numbers crimes, they also provide statistics such as weapons used, motivations and more.

The ready availability of interesting data sets is what lead me to choose this topic over other choices, I feel that with this information this CA will be informative and relevant to the stated goals in the summary.

There have been various data visualisations done in relation to this topic, many of which utilize the same statistics I opted to make use of. Given the very relevant and highly publicised nature of the topic I have chosen all of what I will demonstrate has at some point been demonstrated before. In order to separate this CA from what has been done before, I will aim to provide interactivity and multiple visualizations which support one another to provide better context.

# **Seven Stages**

## Acquire

I considered a number of different data sources when preparing for this CA, prior to choosing my topic I looked at information made publically available by Amazon through Amazon Web Services’ Datasets Website. This website has a large number of interesting datasets, a number of which I would like to work with at some point.

Another consideration is the publically available datasets published by the Irish Government at data.gov.ie. This was a major consideration as the information available pertains to Ireland and therefore the discoveries I make would have a larger relevance to me personally.

Ultimately I decided to go with the FBI Crime statistics as I found it be a comprehensive and informative set of information which could be worked with easily, as well as for the reasons outlined in the Background.

## Parse

The FBI Dataset is quite extensive, there are a large number of statistics available and from a great number of years. My methodology for categorising this data to be used, involved focusing on one particular area, for example Crime Rate by Race then searching the FBI database for relevant statistics. I would then choose the most recent data for use in the chart. The two main areas I focused on were Violent Crime and Race, as a result I choose datasets relating to the Crime Rate since 1994, Crime Rates in relation to states and two datasets involving offenders and victims of violent crime.

I also had to separately find and tie states and races together by population as this statistic was not available in the FBI datasets, doing so enabled me to get the Crime Rate per Capita statistics. I also looked into using Google’s “Google Refine” software, however I found that the FBI Datasets were already cleaned up and ready for use.

## Filter

The majority of the datasets I utilized included information which was not relevant to the topic I had chosen. The dataset highlighting Murders by State and Types of weapons for example included states which were not part of the contiguous United States (Alaska, Hawaii, etc.) which I removed and recalculated the totals to reflect.

A large amount of filtering went into the Racial Crime Statistics, the original datasets I utilized included many other demographics, such as Religion, Gender, and Sexual Orientation etc. In order to focus upon race as a topic I filtered other demographics out, this also required a recalculation of totals.

The Racial Crime statistics also require filtering to remove property based crime from the dataset as this CA’s focus would be upon violent crime. As a result of this I restructured the data and recalculated the totals to accurately reflect upon violent crime only.

I separated the weapons statistics out from the states in order to be able to generate a Bubble Chart to focus entirely upon them.

## Mine

As I mentioned in the Filtering area a lot of the charts had to be formatted to reflect new totals as data was removed. To do this I added formulas to the excel tables to automatically sum up new totals as changes were made. This was useful several times, particularly in the case of the Racial Datasets which went through many iterations to remove statistics from groups such as Native Americans/Alaskans, Pacific Islanders and multiple/other races.

I also utilized some data mining in the representation stage of the Crime Since ’94 chart, I used Tableau to generate a trend line based on the average rate of crime over the years. Similarly I used Tableau calculated fields to generate crime statistics per 100,000 people where relevant.

## Represent

**Dashboard 1: American Crime Statistics**

This dashboard is used to represent general information about the Violent Crime rate in the US. I choose a variety of the visualizations to represent the data I had acquired. For the Crime Rate per state, I opted for a filled map, this allows me to visualize the differences using different shades of colour. I found a gradient from white towards Red was quite striking and suited the theme quite well and was worked well to contrast the differences.

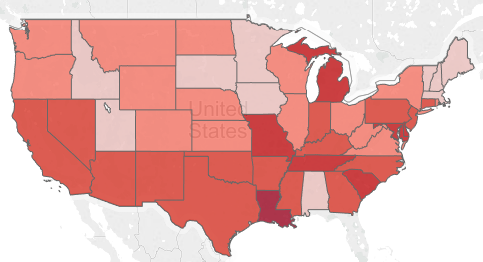


Figure 1: Red Contrast on US Map representing murder rates, Notice large difference between Louisiana and Idaho

To represent the crime rate over time since 1994, I opted to use a line graph. This choice allowed me to demonstrate figures from multiple years without clutter, it also clearly demonstrates peaks and valleys in the crime rate over the years.

Initially to represent the types of weapons utilized in Crime I choose to use a Pie Chart as I felt it would highlight the proportions nicely. However, I changed my approach to utilize a Bubble Chart instead when I discovered the Pie Chart to be quite cluttered.

**Dashboard 2 – Crime Statistics Race**

The goal of this Dashboard was to represent racial differences in terms of crime rates in the United States. I choose two metrics to achieve this, offender rate and victim rate, these metrics indicate the number of people per 100,000 people who have either been the perpetrator or victim of a crime for 2013.

I found the Pie Chart was suitable for displaying this information as I was only looking at three races, therefore there wasn’t much clutter involved and I did not encounter the issues I previously had with the weapons. The use of the same chart for both metrics provides a very interesting contrast between the two which is immediately obvious at a glance.

## Refine

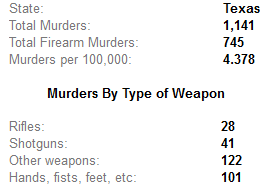
I utilized a tooltip with the map to display further information about the type weapon used commit each murder per state. I did this because I wanted to accurately represent all the dataset while also keeping the map easy to read at a glance. I applied this in various ways throughout both dashboards, for the Crime Rate since ’94 and Types of Weapons used charts I used it to display totals.

Figure 2: Tooltip example

For the Crime Statistics – Race dashboard I found it useful to display more information than was immediately obvious in the Pie Chart. I used the tooltips in this instance to represent the different types of Violent Crimes as well as provide further information such as totals and exact measure per 100,000 individuals.

## Interact

To facilitate interactivity in the map chart I made use of a parameter to filter states by their rate of crime. This parameter simply subtracts a number determined by a slider from the Crime Rate to adjust the colours of the map. The use of this parameter allows users to “step-through” various levels of crime rate to demonstrate the worst areas. This can be seen here:

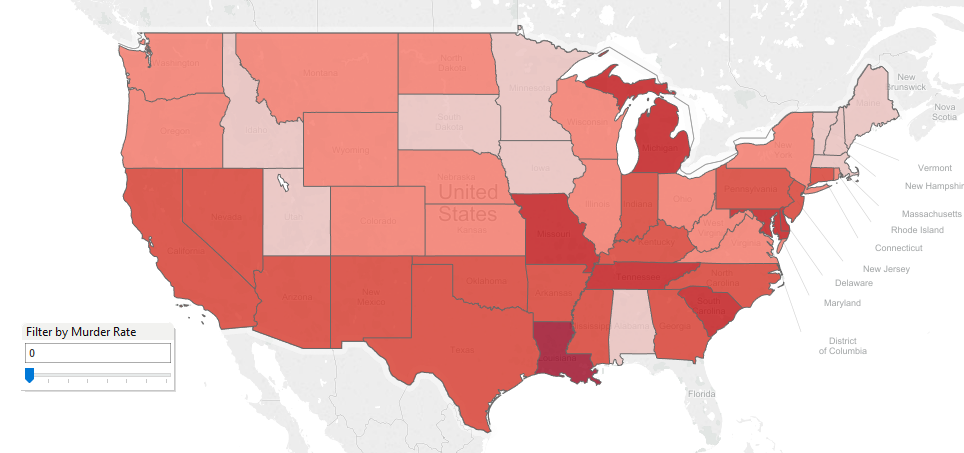


Figure 3: Murder Rate Set to 0

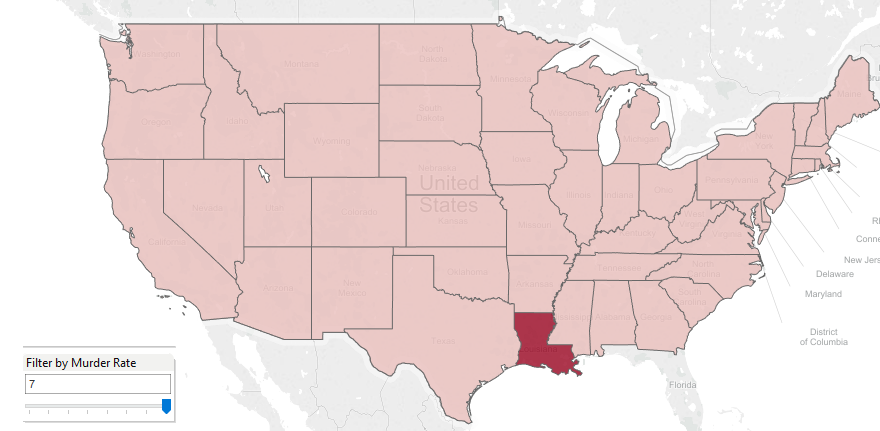
This figure demonstrates how the Murder Rate Slider looks when it is set to 0, this is how it appears when turned all the way up: 

Figure 4: Map with Slider Turned up

This Parameter is allows for a quick assessment of the situation as it stands, it highlights the key areas and provides an interesting level of interactivity.

I also utilized Tooltips in every graph as previously mentioned, these provide the user with more relevant statistics about the area they have hovered over, this is most extensively used in the map and the Pie charts.

# **Problems & Solutions**

## GDP per State:

One of the areas in I ran into problems was attempting to contrast the murder rate per state versus the GDP per state. To do this I created a map diagram and used each state’s GDP as a colour highlight, this can be seen here:

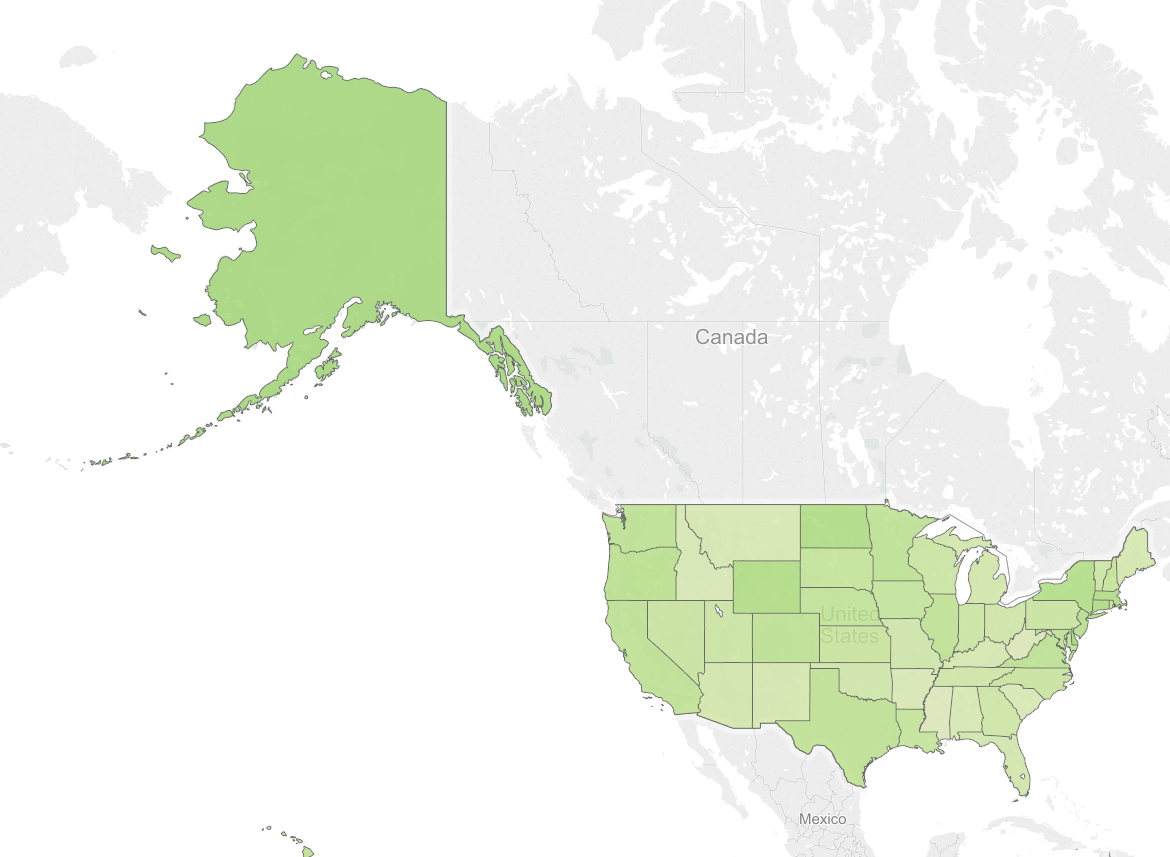


Figure 5: GDP per State

I opted not to use this visualization however, as I did not feel there was a strong correlation between GDP and murder rate and as such I did not think this visualization fit with the other visualizations I was presenting.

Instead of looking at wealth inequality as it pertains to crime in the United States, I opted to look at the race issues, which I felt fit with the other data I am displaying. Luckily there is a large amount of data available on this topic.

## Pie Chart Issues:

Another issue I encountered was the use of a pie chart to represent types of weapons used in crimes for the year 2012. I found that this chart was unsuitable as the labels would not display correctly, it also wasn’t entirely clear which slices represented which data. This can be seen here:

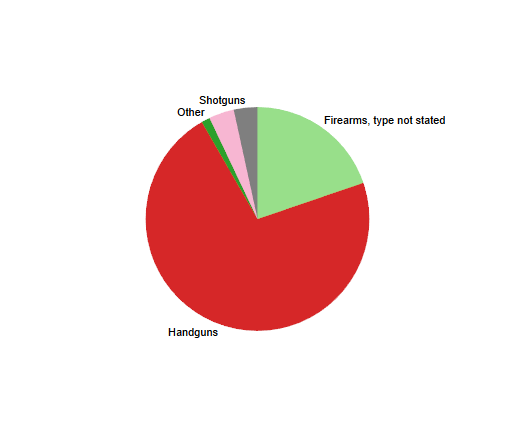
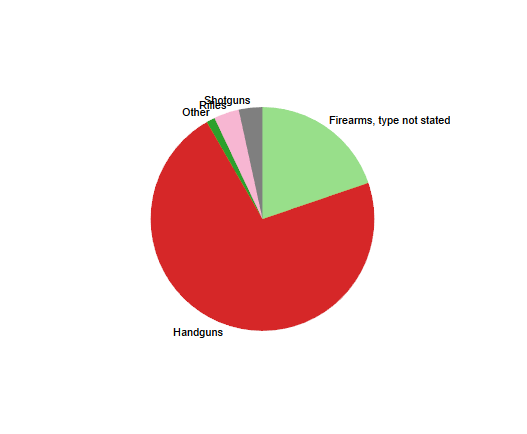


Figure 6: Pie Chart Label Omission

Figure 7: Pie Chart Label overlapping

This can be worked around by allowing Labels to overlap one another as demonstrated in Figure 7, however I felt this clutters up the diagram making it difficult to read at a glance.

Given this, I decided that the pie chart would not be a suitable visualization to display this data, in the final version of the CA I opted to us a Bubble Chart. The Bubble Chart has the advantage of displaying difference through size, while also allowing labels to display accurately.

# **Conclusions**

Going into this CA I was pretty confident of the kind of results I would discover, the mainstream media had portrayed the United States as having a rampant violent crime problem punctuated by the seemingly ever more frequent mass shootings, this is the view I had of America. While I can say that my perception was correct in some aspects it was wrong in others. In this conclusion I will detail each visualization in this CA and the conclusions I have drawn from it.

## Dashboard 1: American Crime Statistics

### Murder Rate per 100,000 Americans 2012

This visualization highlighted a number of interesting areas. Firstly, and most prominently the crime rate in Louisiana is dramatically higher than any other state, it has a murder rate of 9.887 per 100,000 citizens, when compared to the next highest, Michigan at 6.900, this figure is quite shocking.

According to an article by News Outlet Business Insider, this can be attributed to a number of different reasons. One such reason is Louisiana’s relatively lax gun control laws, the state has some of the loosest regulations regarding this in the United States, and Citizens are even allowed to apply for lifetime concealed carry licences.

As well as this Louisiana has a high level of poverty with the “third-lowest median household income ahead of Mississippi and Arkansas” (Fuchs, 2013). Given the high poverty rate and lax gun laws it is not surprising that the murder rate is so dramatically high.

This visualization is useful as it highlights this issue very clearly and prominently, I was not aware of Louisiana’s murder rate until I visualized this data. Upon further research it has provided some level of insight into the reasons why a state might have a high murder rate.

### Crime Rate Since ‘94

I found this chart to be the most surprising of all the data visualized in this CA. As mentioned previously my assumption was that violent crime in America has been on the rise the past few years, this was encouraged by the media and greater coverage of crimes.

However, this chart demonstrates that crime in the US has been steadily dropping and is currently at its lowest levels since 1994. While there were spikes in both 2001 and 2006 this trend has remained true since 1994, the number of violent crimes committed in the US in 2013 was 1,163,146 which is dramatically lower than the 1994 figure of 1,857,650.

### Types of Weapons used in Crimes 2012

This chart was not particularly surprising, however, there are some interesting facets to it. Handguns are by a large margin the leader in the number of violent crimes committed. This is the result of a large amount of easily accessible handguns in America, according to a 2007 report by the Harvard Injury Control Research Centre 38% of Americans own at least one gun, and of that group 64% own at least one handgun.

Given this large handgun availability, it is not surprising that it is the preferred weapon for murder.

## Dashboard 2: Crime Statistics – Race

### Offenders by Race

This pie chart highlights known offenders and categorizes them by Race per 100,000 people. This is an interesting chart as it highlights the disproportionately large number of crimes committed by Black / African Americans when compared with the other two races.

This statistic highlights a large inequality between races, this is one of the key issues in America today especially given recent high-profile riots. After seeing this statistic I researched the reasons why the Black/African-American demographic is so overrepresented. An analysis carried out by Channel4 suggested two primary causes, firstly there is a level of discrimination in the American Judicial system, meaning Black Americans are more likely to be prosecuted than White Americans for the same crime. Secondly Black Americans generally have a higher poverty rate than other demographics, poverty has been linked to crime, and Channel4 suggests that there is a link between the two.

### Victims by Race

This chart demonstrates the opposite, it visualizes the number of victims per 100,000 people as broken down by race. It highlights a shocking discrepancy between the races, Black Americans and Asian American are far more likely to be the victim of a violent crime than White Americans.

According to a report by fivethirtyeight.com Black Americans are 8 times more likely to be the victim of a violent crime than White Americans. I found it interesting to see that it is far more likely for a White American to commit a crime than it is for them to be the victim, the opposite is true for both Black Americans and Asian Americans.

I found that this discrepancy highlights the divide between White Americans and other racial minorities in the country.

Overall I feel this visualization project has been informative and interesting, it has lead me to revaluate some previous assumptions while confirming others, while also leading me to new discoveries.

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