Data Visualization Final Process Book

U.S. Terrorism Trends

A data visualization work to reveal the truth of Terrorism in U.S.

Jinyan Lyu

Qing Xu

Tingting Ma

Background and Motivation

Terrorism has been a severe threat to world's safety for years. In the world's big picture, after several years of study and debate, although there are still people who tend to blame it on religion, it turned out that terrorism is more a Middle East problem than Islamic problem, due to a very complex colonial history which is even longer than modern terrorism itself, and multilateral economic interests between their former colonial countries. Knowing that country leaders around the world are wisely taking actions and seeking cooperation to prevent terrorism from separation. From internal affairs point view, U.S. government has been fighting terrorism for years, especially after 9.11. Same as the world situation, the reasons for domestic terrorism are very complex, and this is what our project trying to figure out. Our project is focused on the terrorism trends in the United States. By looking into the data of past attacks, we are trying to find the pattern of terrorism, and hope to counter terrorism in a better way.

Project Objectives

There are several aspects for us to understand the trends of terrorism in the U.S., from a micro aspect, when did the attack happen, what was the target, what was the motive, how did they do it, and also from a macro aspect, total number and frequency of attacks, terrorist groups responsible for these attacks. In this project, we want to explore answers for these questions: Is U.S. government effectively fighting the terrorism? What states are terrorists top targets? Where is the most vulnerable targets that police need to protect most, like school, public transportation? What terrorist groups are most active that should be destroyed urgently? These are the questions we want to answer.

Data

We find the data from website global terrorism dataset which is led by The National Consortium for the Study of Terrorism and Responses to Terrorism (http://www.start.umd.edu/gtd/about/; http://start.umd.edu/).

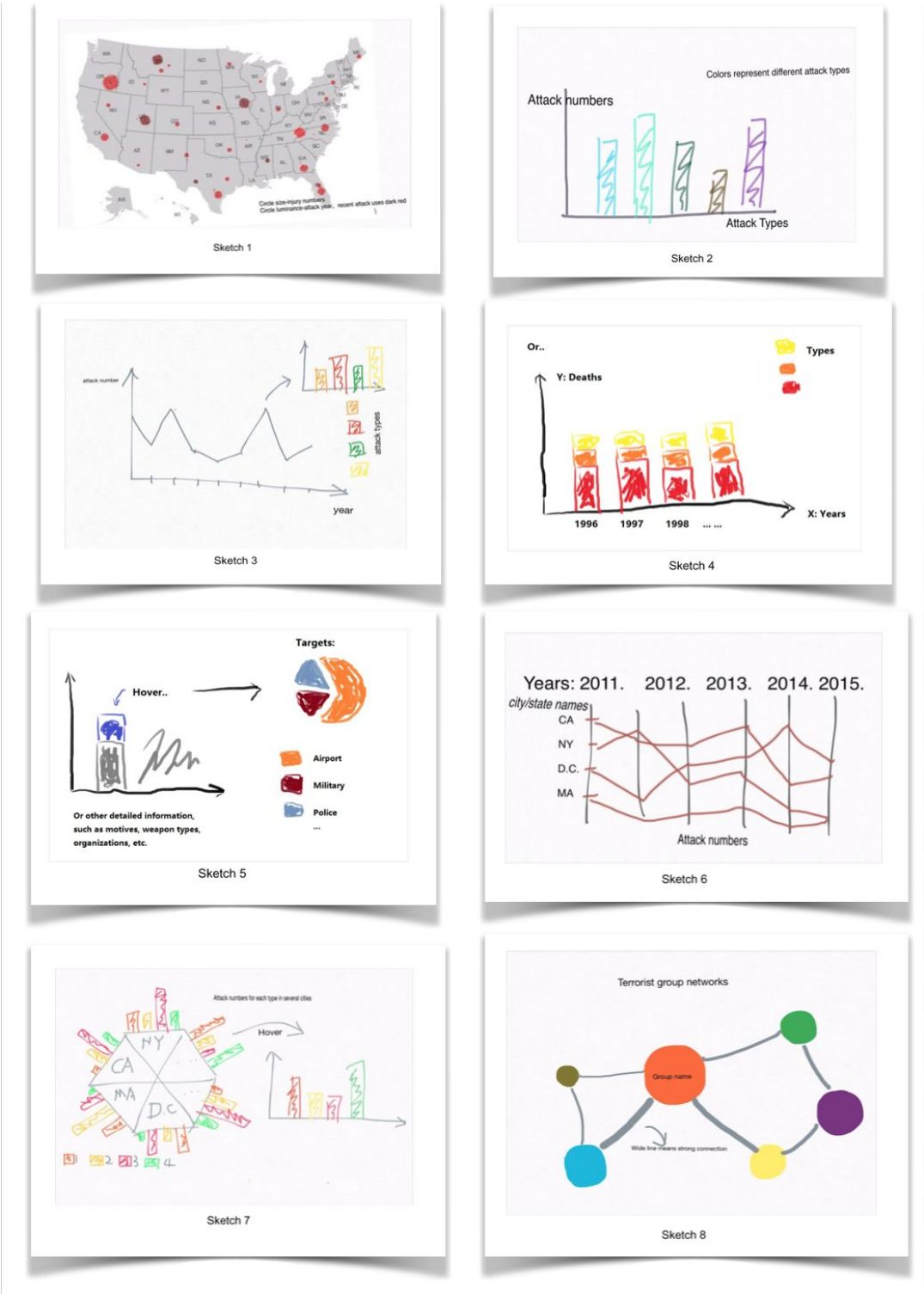
Data Processing

The original data includes global attacks from 1970 to 2015, which is about 130MB. We will focus on the attacks in the domestic. Many data around the 1970s is missing, and we care more about the recent pattern of terrorism, so we will focus on the data from recent 20 years.

Design Evolution

For this dataset, we want to visualize at least these information to the audience: How many terrorism occur in each year? What are the trends? Do they happen more and more frequently or less frequently? Where was these attacks taken place?

At the beginning of the project, we came up with 8 sketches: a map, bar charts, pie charts, a line chart, bubble charts and parallel coordinates plot.



We plan to us a map to visualize locations of attacks as well as attack numbers.

To address the attack weapon type information, we consider about using a bar chart to plot the total number of these types, as shown in sketch 2. As in the sketch 3, we plan to plot trends as well as each year's information, and when mouse hovering on the point, it will show a bar chart with attack types. Finally, we decide to use stack bar chart shown in sketch 4 because it can represent in sketch 3 without hovering, and it is easy for the audience to compare attack types changes in different years.

And the feature in sketch 5 can be added to sketch 4: when a mouse is hovering on a bar of a certain year, a pie chart will show the portion of different attacked targets.

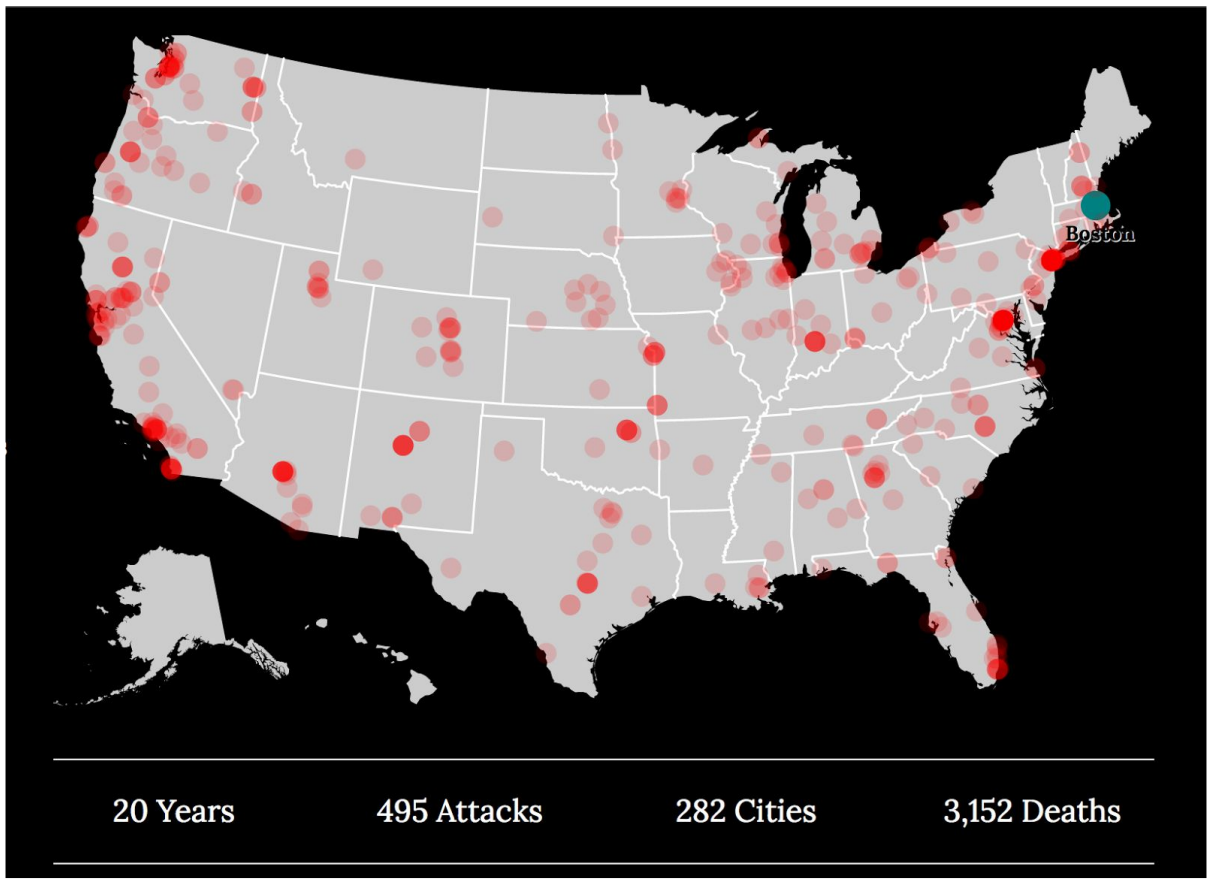
For sketch 6 and 7, we plan to pick top states that were attacked most, use a parallel coordinates plot to present the attacked trends. Sketch 7 is an optional feature, since attack type in a single state may not be that important, but still be nice to have one.

Another optional visualization is the links between different terrorist groups, as shown in sketch 8. It would be nice to looking to the dataset to find the networks if possible.

Implementation

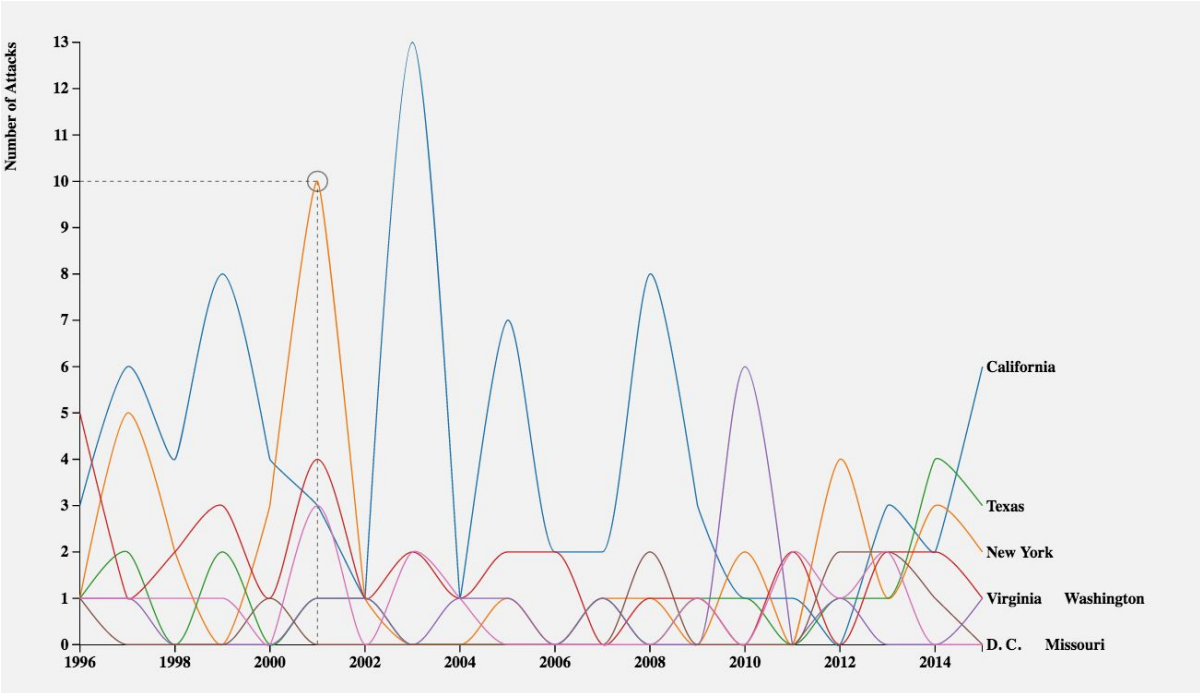
We uses five visualizations to present the dataset.

Visualization 1 Terrorism attack map



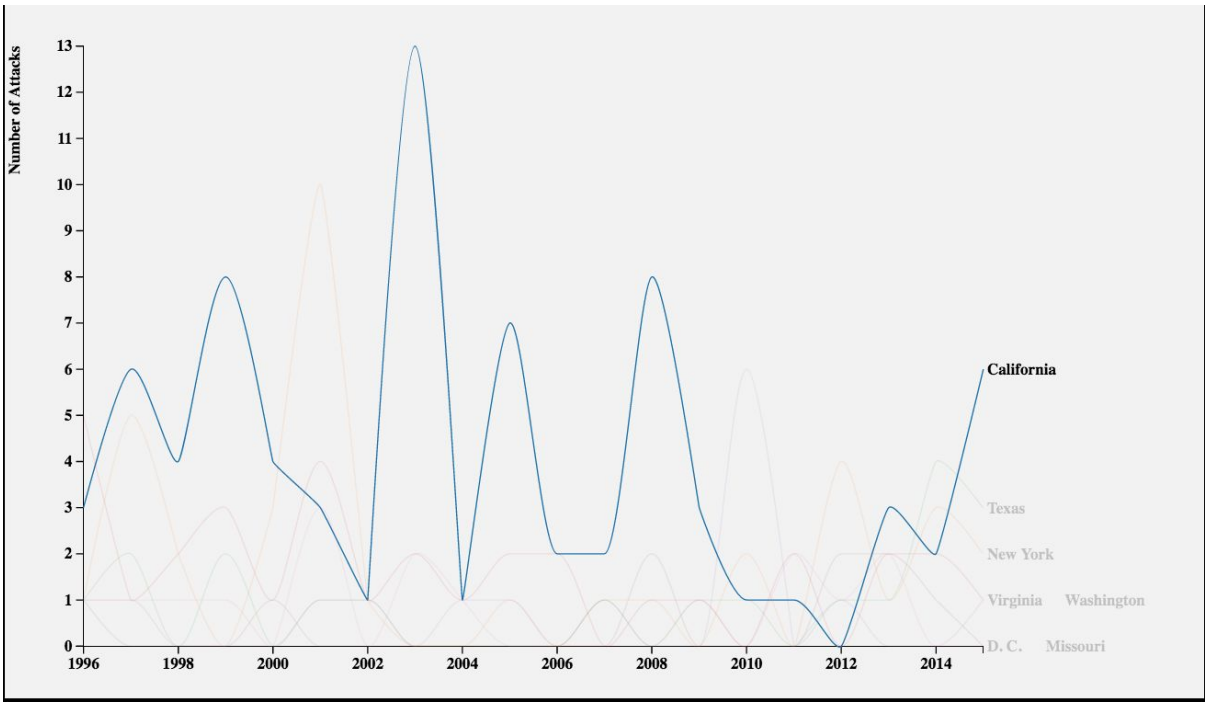
This map is aimed at giving the audience a general view of terrorist attacks happened in the U.S. in recent twenty years (1970-2015). There are 495 attacks in total,each attack is marked as a red dot on the map. The dot highlights and shows the name of the attacked city when the mouse is hovering on the dot. As we can see from the map, areas around Seattle, San Francisco, Los angeles, Chicago, New York city, Boston and Miami beach was attacked much more compared with other areas.

Visualization 2 Attacks in seven states

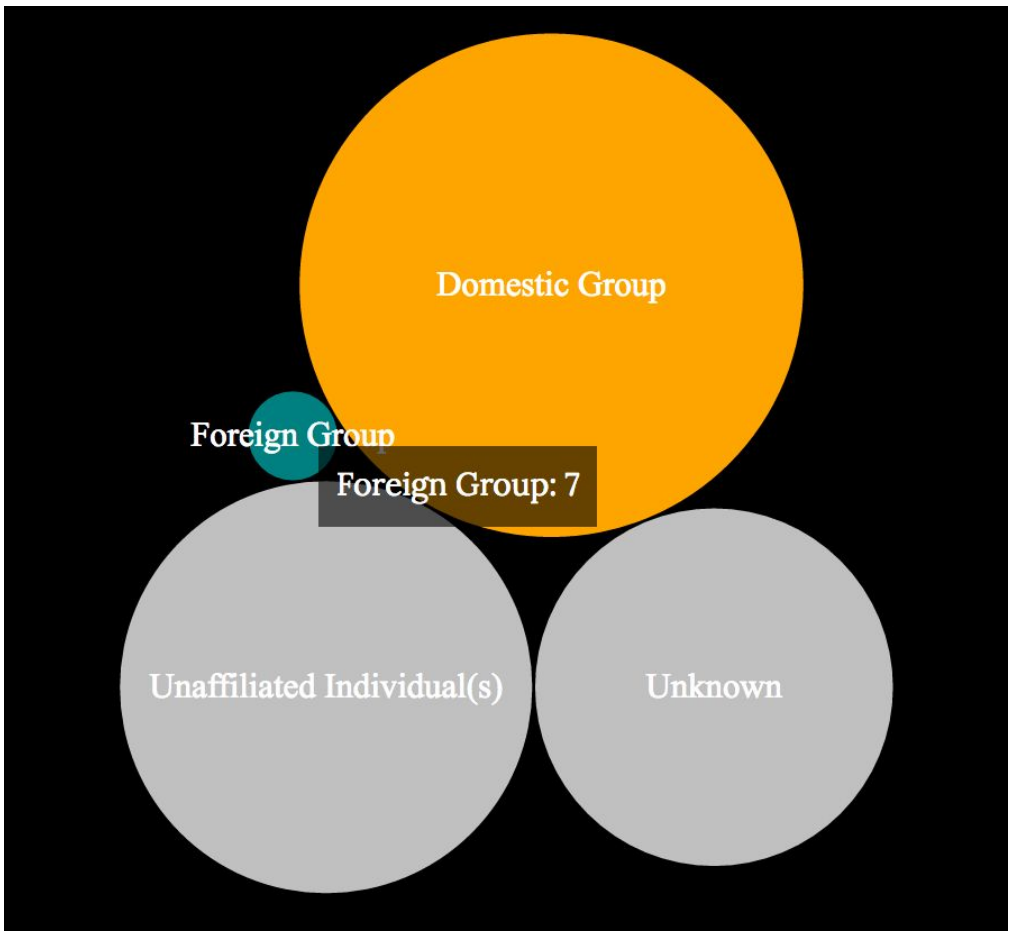


The line chart shows the most vulnerable seven states which easily become targets of terrorists in the past 20 years. When mouse is hovering on the chart, it shows the peak number of attacks among this seven states. For example, in 2001, New york is the state that was attacked most, which is 10 times, including 9.11 in that year. And California in blue line shows that, in general, was attacked more than 70 times in the past 20 years, while the total number of the U.S. is 495, which ranks the first among all the states. And the other six top states New York, Texas, Washington, Virginia, D.C. and Missouri. These states may need a stronger protect and more efficient way to fight against terrorism.

And if you are interested in attack trends of a specific state, just simply touch the state name. For example, if we choose California. We can see in 2003, it was suffered from 13 terrorist attacks. And the number in recent two years is going up from 2 to 6.

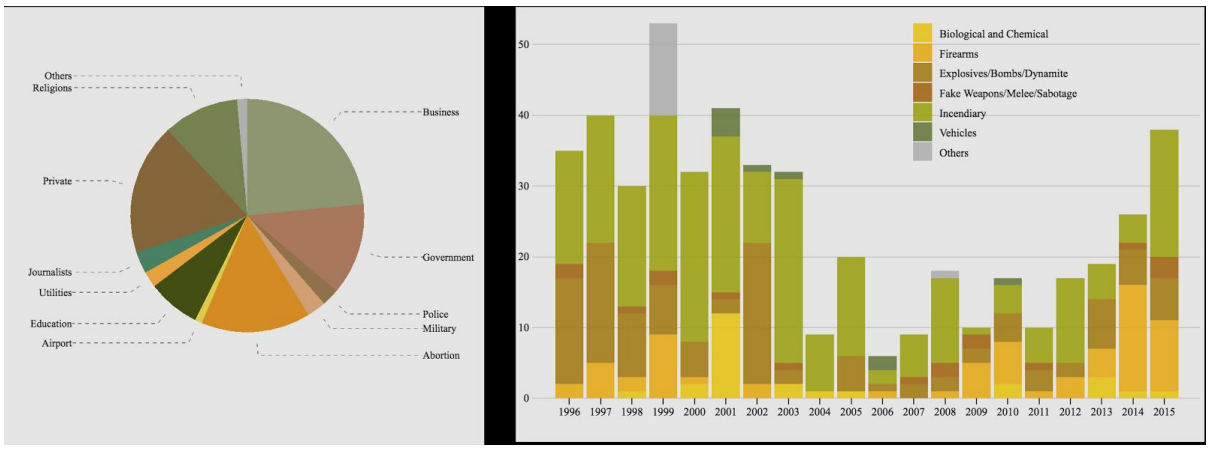


Visualization 3 Terrorist groups responsible for the U.S. attacks



This bubble chart is focused on types of terrorist groups that responsible for 495 attacks in domestic America. These terrorist groups can be divided into four types: US Domestic Terrorist Groups, Foreign Terrorist Groups, Unaffiliated Individual(s), Unknown.
As we can see from the bubble chart, among total 495 attacks in the recent 20 years, 224 attacks are from the U.S. home grown terrorist groups, while only 9 attacks are from foreign groups. That is why CNN reported "Every lethal terrorist attack in the United States in the past decade and a half has been carried out by American citizens or legal permanent residents, operating either as lone wolves or in pairs, who have no formal connections or training from terrorist organizations such as al Qaeda or ISIS."
Check the whole report here: The real terror threat in America is homegrown (http://www.cnn.com/2016/06/12/opinions/orlando-homegrown-terror-bergen/).

Visualization 4 Weapons and targets



In this section, we presented general statistics about terrorist attack targets as well as weapons used in attacks. By doing so we hope to help found solutions to prevent attacks from the very beginning (by weapon control), and minimize the loss (by strengthening security). To make the charts more readable, we organized the data into 7 categories of weapons and 12 categories of targets.
By default, the pie chart on left shows the overall targets statistics in the 495 attacks. Besides business and government buildings, we noticed that religious and abortion related buildings made up nearly 1/3 of total targets. These places are less protected than other targets like airport or police, so people who took charge of hospitals and churches may consider increasing security investment.
In the stacked bar chart, we can see yearly attack numbers and weapons use. The total attack numbers decreased significantly in the mid-2000s and reached the bottom in 2006, but had been increasing year by year since 2011, while the use of firearms in attacks during this decade is more than last decade. As we can see, government buildings made up half of the chemical and biological weapon targets, while this might be the result of strict inspection of

other weapons in the entrance, but also indicates even government buildings still have room for improvement.

Visualization 5 Media coverage keywords

The word cloud was created with the the string of all of the motive reported by the media in the 495 attacks after filtering out the meaningless words. The python wordcloud package picks the 200 most commonly used non-stop words in the given strings and assign then the frequency-related size.
As we can see, words like "animal" and "abortion" stand out surprisingly, as we usually do not link them to terrorist attacks.

Conclusion

At the very beginning we started the project to help prevent terrorist attacks from happening. As the project goes, we found one of the seemingly most important issue is people missing the big picture and targeting the wrong groups.
911 is an extremely unique event in both weapon/target and motive that no other attack in the past 20 years is similar as this. Metropolis suffer more attacks but take population density into consideration states in the middle also under threat (see Missouri in line chart). Nearly ⅓ attacks were related to abortion and religion. And homegrown terrorism groups that committed attacks are over 30 times more than foreign groups.
Data has multiple ways to be visualized, but the only aim to bring them in front of people, at least for this project, is to show some facts and see what’s really happening. And the conclusion of the project is, don’t jump to the conclusion too soon. Or we might pay a painful price because of that.

Reference

We used Foundation (http://foundation.zurb.com/) to build the first version webpage, then switch to BootStrap (http://getbootstrap.com/) in the final version.