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, but 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., including when the happened, what's the target, what's the motive, how they did it, in micro aspect and number, the frequency of attacks as time change in a macro aspect. Is U.S. government effectively fighting the terrorism? What states or cities are easy to become the target? 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 1970s-to 2015, which is about 130MB. We will focus on the attacks in the U.S. 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

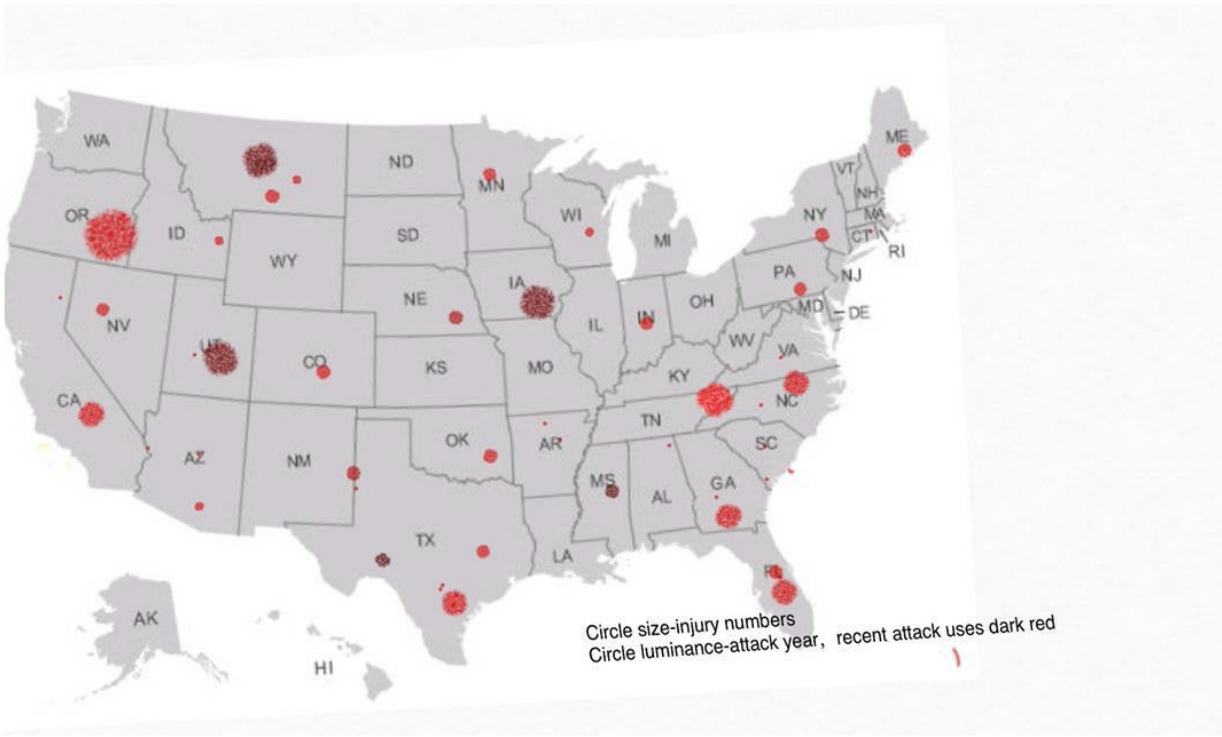
For this dataset, we want to visualize at least these information to the audience: How many terrorism occur in each year, and in recent 5-10 years? What are the trends? Do they happen more and more frequently or less frequently? Where was these attacks taken place? A map is a perfect way to visualize locations of attacks as well as attack numbers. As shown in sketch 1, red dots will be used to encode the occurrence of each attack, the dot size shows the number of injuries. And we also consider to use color luminance to present the occurrence time of attacks, dark red dot means the attack happened recently. If applicable, animation or interactive can be used to show attacks in specific one year or several years according to the audience choice. And the time duration function in D3 may help to produce the visualization of how these change as time passed.

To address the attack type information like Armed Assault, bombing or kidnapping, we consider about using a bar chart to plot the total number of these types, as shown in sketch 2. Or use a steam graph to show the same thing without interaction. As in the third sketch, we are able 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 6 or 8 states or cities that were attacked most, use a parallel coordinates plot to present the attacked trends in each state for each year or every 5 years. And use a group bar chart to show the attack types in each state during a certain time, one year or 5 years. 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.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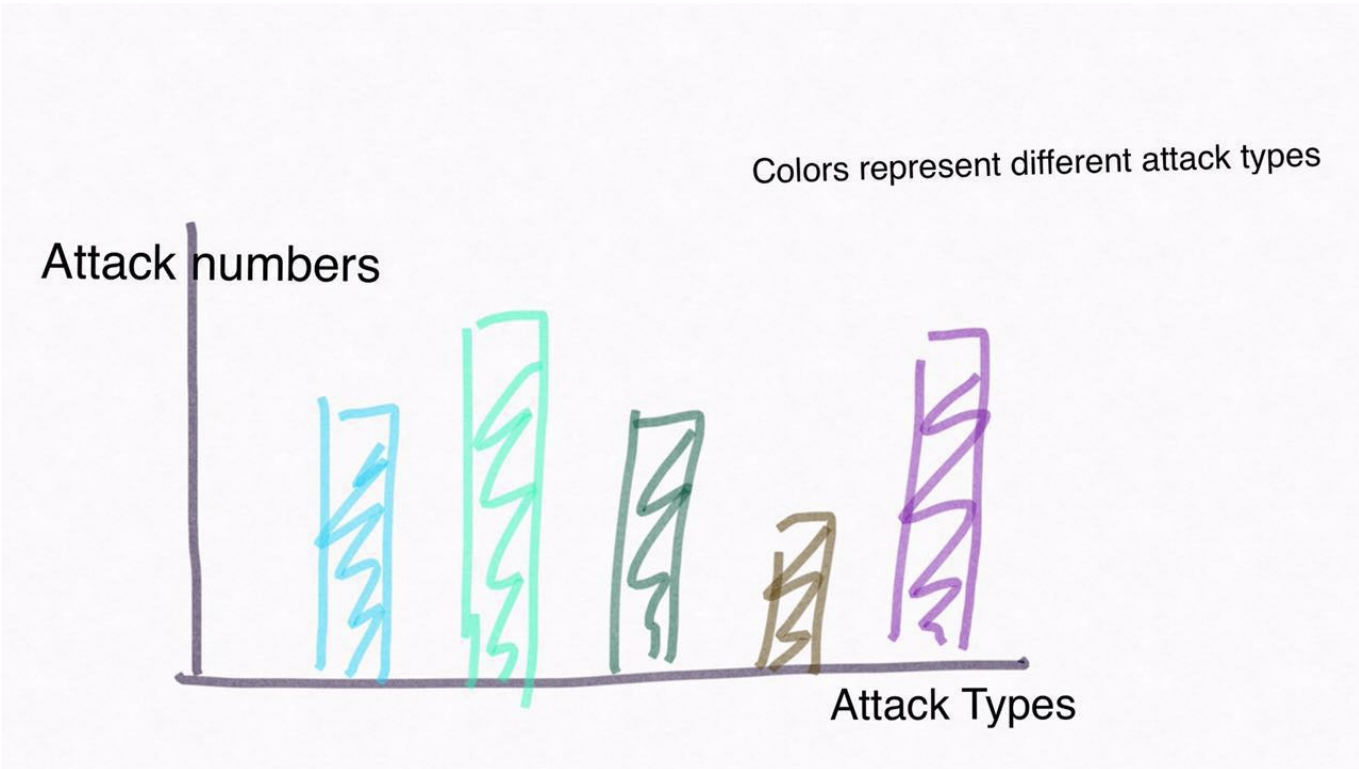
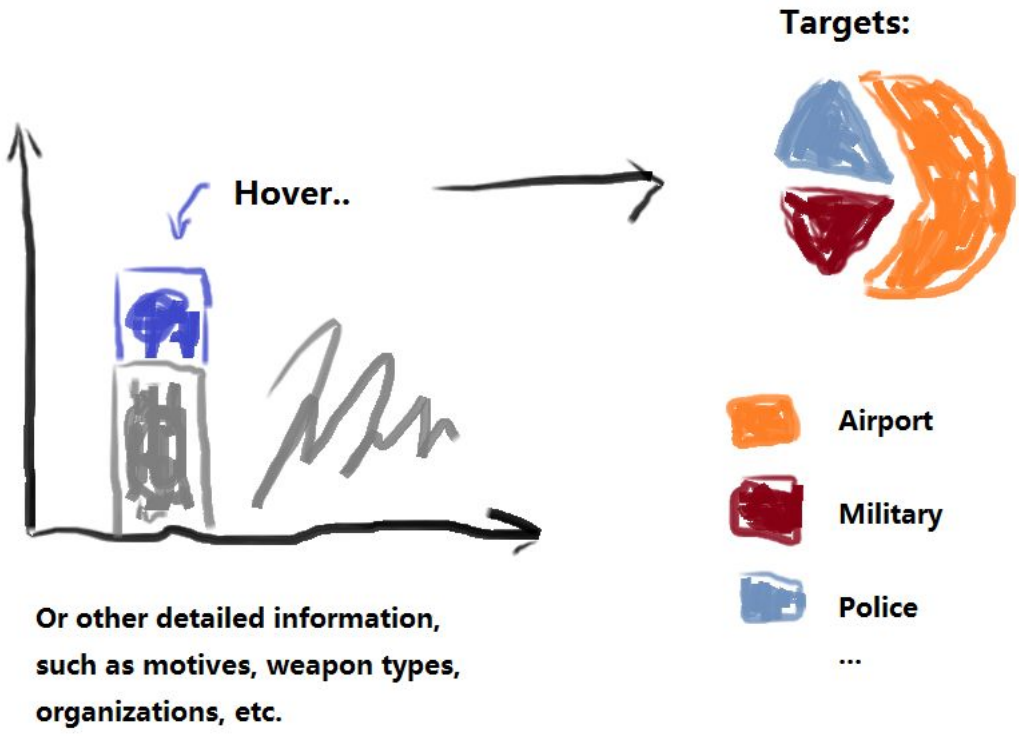
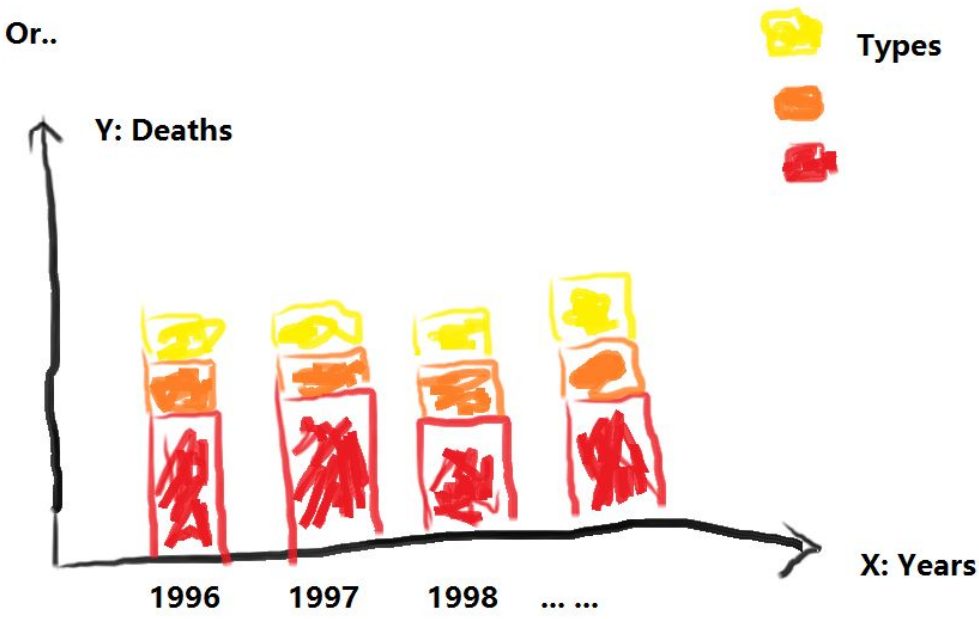
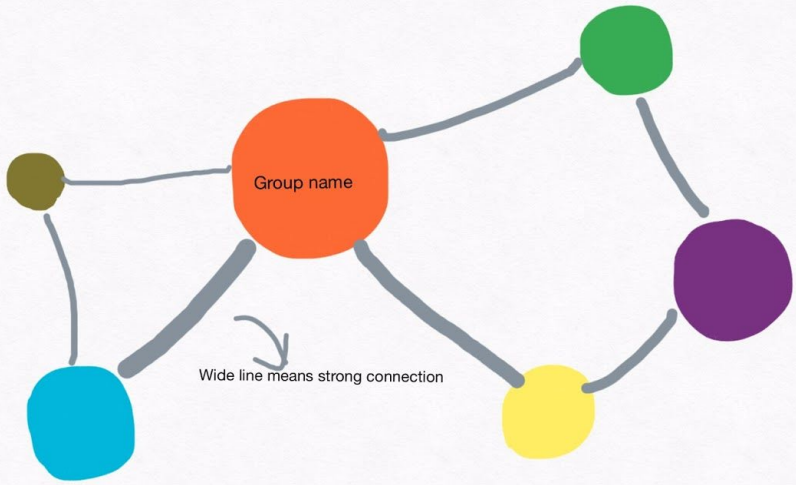
Circle size-injury numbers
Circle luminance-attack year, recent attack uses dark red


Colors represent different attack types
Attack numbers
Attack Types

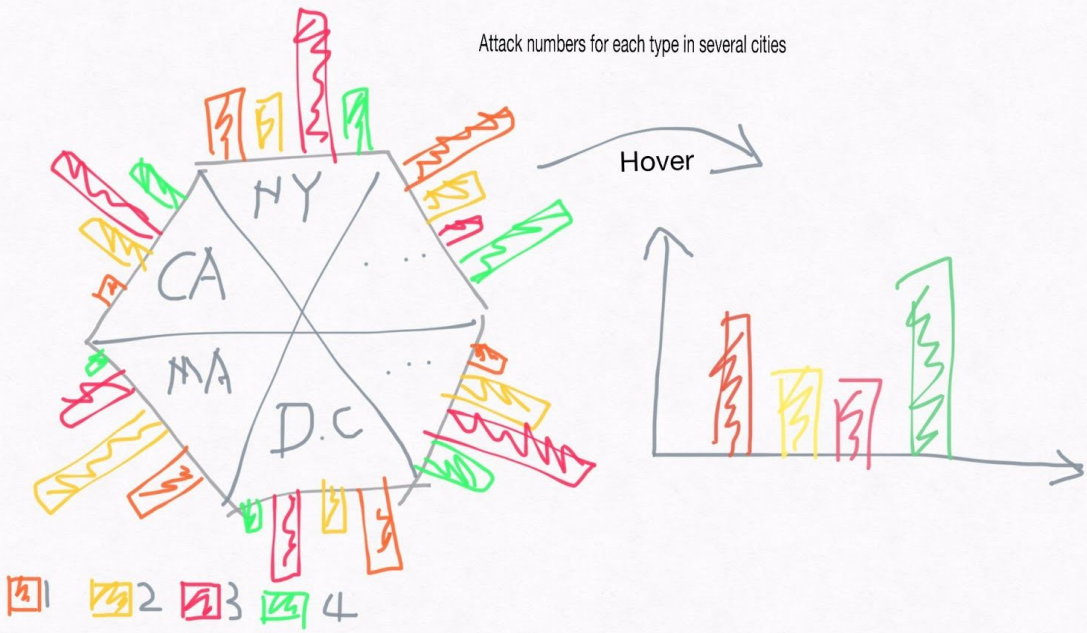

Targets:
Hover..
Airport
Military
Police
...
Or other detailed information,
such as motives, weapon types,
organizations, etc.


Or..
Types
Y: Deaths
X: Years
1996
1997
1998
... ...

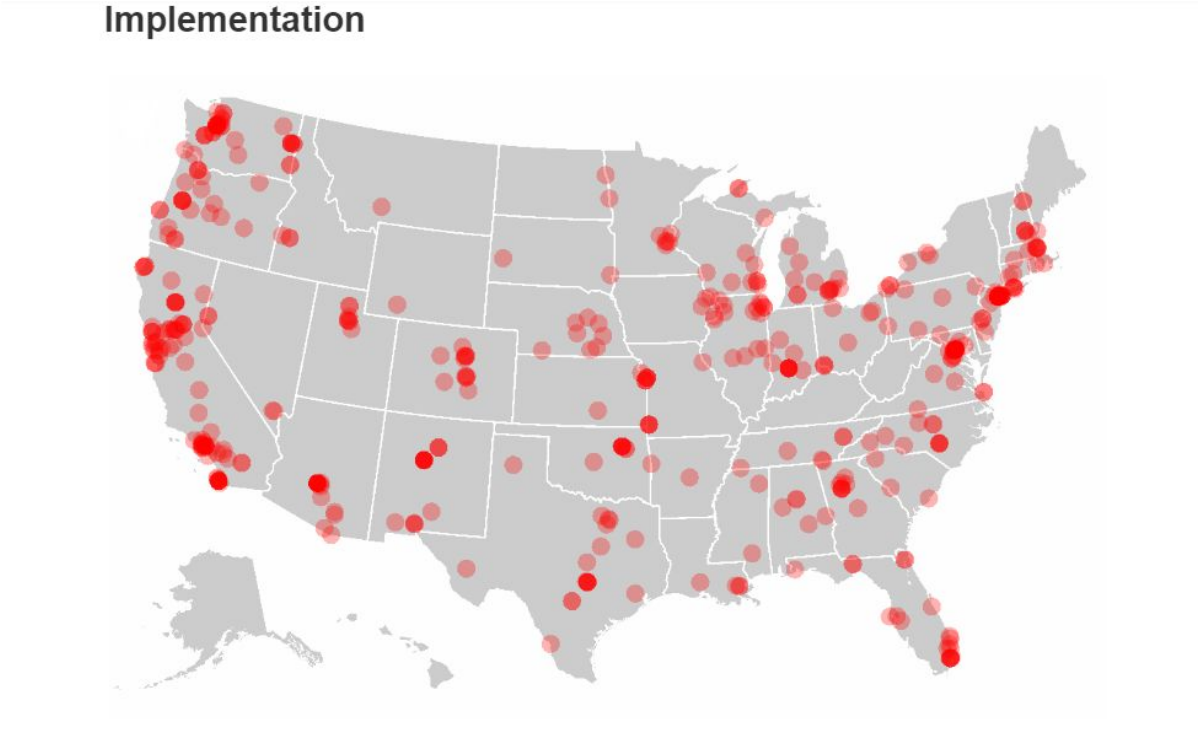
Terrorist group networks



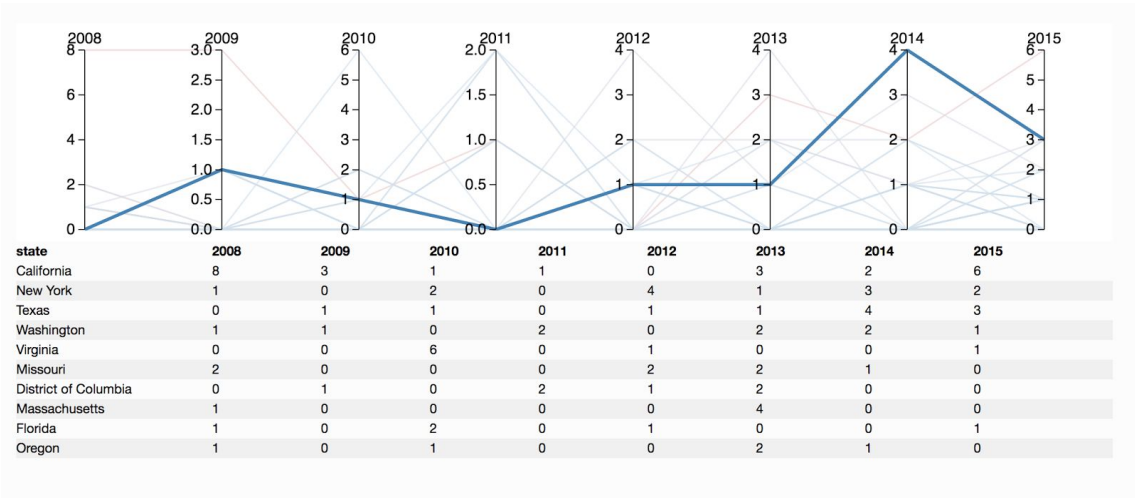
Attack numbers for each type in several cities



Implementation

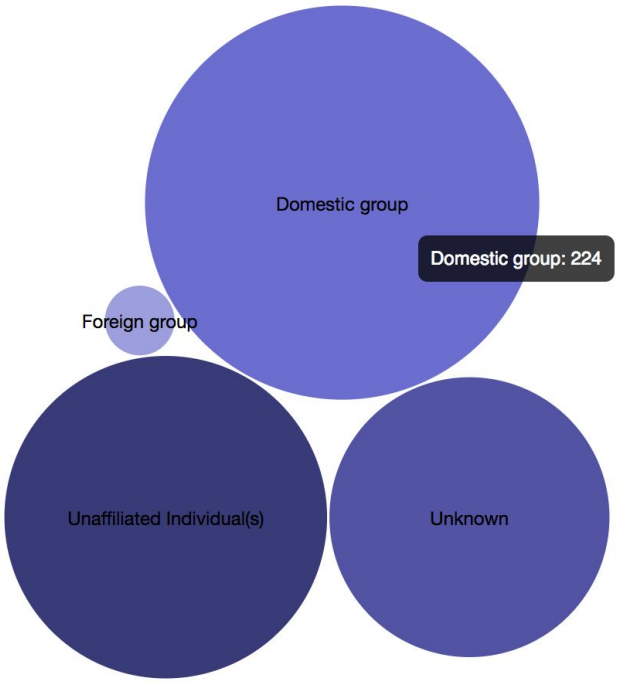


For the map view, at this point we marked the attacked cities, still working on the following functions: hover information, zoom, circle radius sized by damage (death, injuries, property loss).

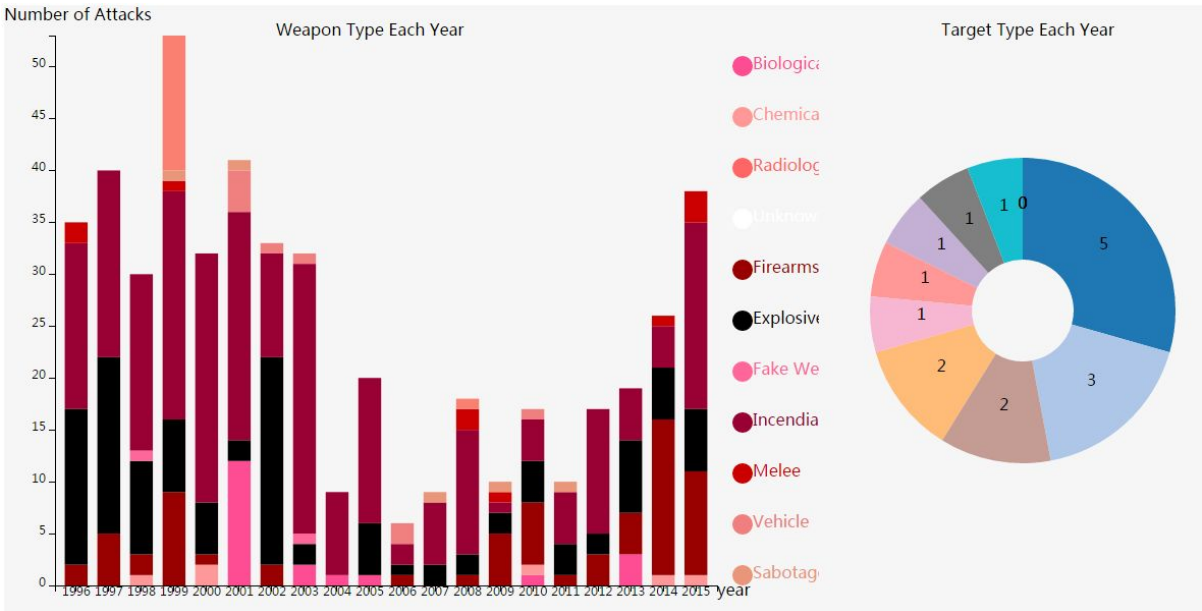


state	2008	2009	2010	2011	2012	2013	2014	2015
California	8	3	1	1	0	3	2	6
New York	1	0	2	0	4	1	3	2
Texas	0	1	1	0	1	1	4	3
Washington	1	1	0	2	0	2	2	1
Virginia	0	0	6	0	1	0	0	1
Missouri	2	0	0	0	2	2	1	0
District of Columbia	0	1	0	2	1	2	0	0
Massachusetts	1	0	0	0	0	4	0	0
Florida	1	0	2	0	1	0	0	1
Oregon	1	0	1	0	0	2	1	0

Parallel coordinates plot to encode the attack numbers from 2008-2015 for top 8 states. Will fix the scale range and label later.



A bubble chart showing the attack numbers from different terrorist groups, the circle size represents the attacks numbers. We can see U.S. Domestic group is the main threat. Will change the bubble color for better visualization.



A stack bar chart shows the number of attacks each year, within which the different colors stacks indicate different types of weapon used. When click on each bar, on the right a pie chart indicating the number of attacks (showed as the number written) aiming at different target types (showed as different colors) will be showed. When hover on the pie chart, a tip box will show what the target type of that specific color is.