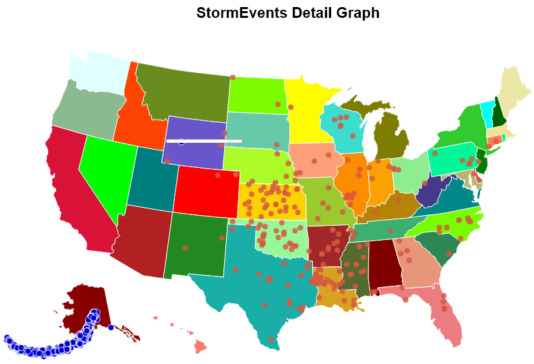
Overview and Motivation:
We tried to visualize different types of tornadoes that caused damage to life in United States of America. We tried to compare different data attributes for a particular tornado by emphasizing on a particular state in country. We were motivated from the dataset obtained. We worked in a different way; we first decided data set and then tried to come up with various visualizations possible from the dataset considered. We tried to go out with natural calamities and observed that data about tornadoes is a rich dataset, so we decided to work on tornadoes.

Related Work:
The weather forecast news that we see in news channel is the very first visualization I ever observed in my life. That's the best and the most interested stuff. We actually wanted to work on something that can be visualized as a heat map, but we couldn't get much important dataset that could be visualized in a form of heat map. So, we went with the considered tornado dataset that could be visualized on a United States map. We were thrilled with the achieved visualization.

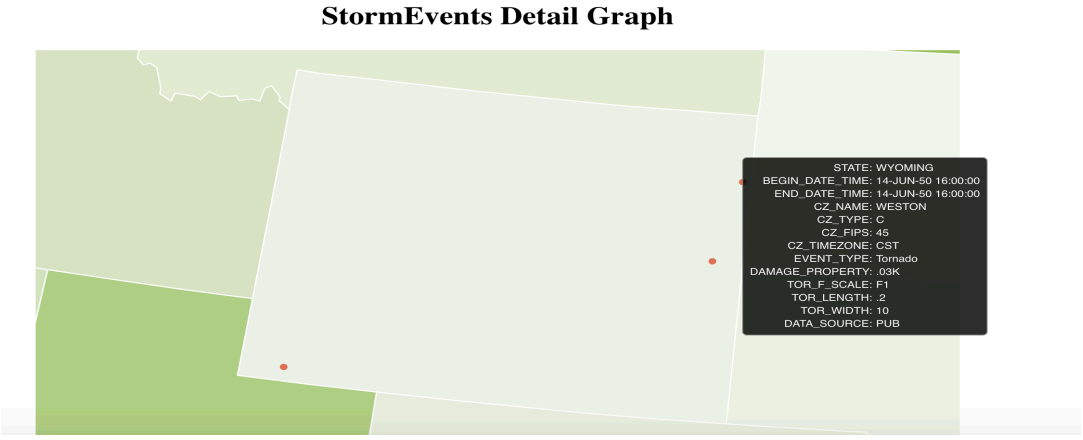
Questions:
We were trying to answer the questions about individual tornadoes that we considered. These tornadoes dealt a huge damage to property and life, so we wanted to see what types of tornadoes hit the country (scale 0-4) and the tornado width (5-300m). The higher the damage, more is the type of tornado and higher the width of tornado. We wanted to study this topic; Texas is mostly affected by it and the western United States wasn't that highly affected by tornadoes. There are few states in United States of America that aren't damaged by tornadoes.

Data:
The data we considered was huge, so we had to cut and scrap it down. The file size was (23MB) when we downloaded it, after cutting down unnecessary data it turned to 340KB. The cleaning of data took lot of time and we worked very hard on it, because the data deals with starting longitude of tornado to ending longitude. It was very hard to imagine visualizing all this data on a single page.

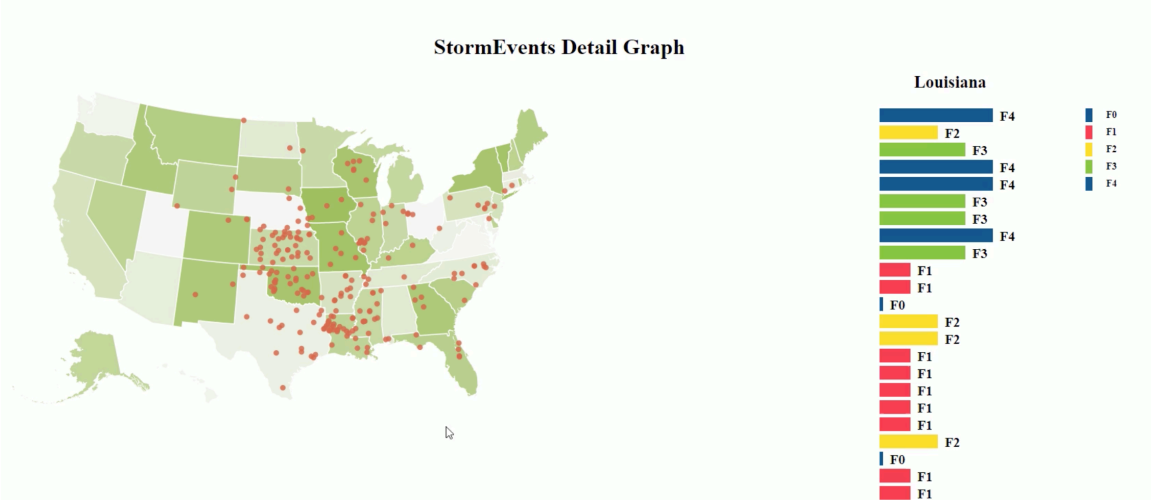
Implementation:
The data we visualized was huge, we made many mistakes initially. We couldn't work on the data we considered initially because it was tough to work with GeoJSON. We failed many times to implement the Visualization in the form of American Map. The visualization went bad after considering different data sets of natural calamities. We visualized both storm and earthquake on same page. It was so bad; I hardly understood the meaning of attributes in data set of earthquake.
The visualization is as below graph:



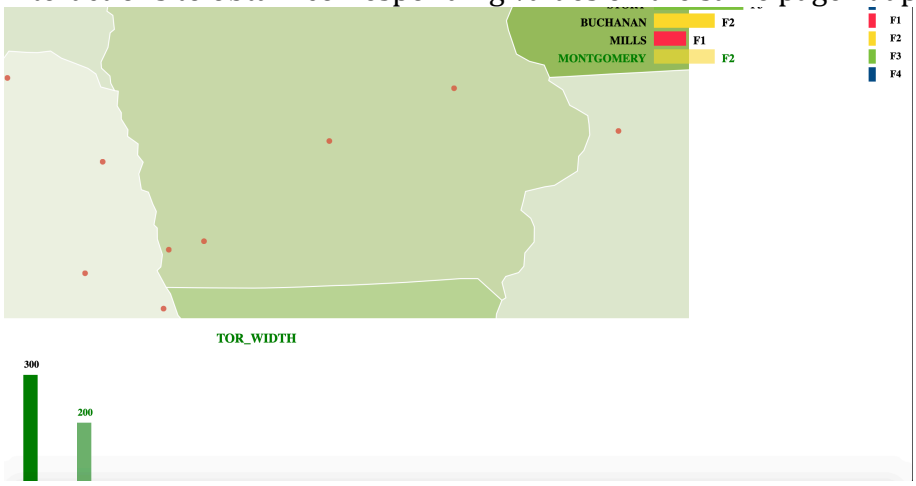
The earthquake data was huge but they were mostly affected in Alaska, so the visualization was extremely bad. So, we removed earthquake data set and tried to visualize the storm data clearer, by concentrating on states.
As you click a state, the entire American map gets zoomed in and shows the boundaries of states helping one to understand the territory bounding of a state. This helps in understanding the tornadoes that take place in a state. We liked this visualization because it was pretty good explaining the tornadoes that happened in a particular state. We then tried to visualize attributes in data set and they all were working well. So we finalized using two of the major important attributes pertaining to tornadoes (the type of tornado and width of tornado).



The attributes of data set were firstly only the type of tornado, and it appeared as below: F0 being the weakest tornado that hit and F4 being the strongest tornado that affected United States of America. The state Louisiana had more tornadoes so attached visualization of data about tornadoes in that state.



These visualizations weren't being clear as people who don't know where Louisiana is might find it difficult to locate the state in United States. So, we visualized the data by showing territory of individual state. We then compared the data with the tornado width. We then named individual tornadoes and visualized them using interactions to obtain corresponding values on the same page. It appears as below:



The data about tornado "Montgomery" was to be checked. So data attributes corresponding to it in our visualization gets highlighted. The state territory gets zoomed in, helping one to visualize clearly about state's territory.

Data Analysis and Design Evolution:

We initially tried working out with heat maps to distinguish scales of tornado from 0-4, but it made visualization look very ugly. It was really hard to analyze the visualization, so we had to change the visualization and use a point plot. We also tried to use scatter plot and distinguish between tornadoes, but even that made visualization look bad and messy. Because there are many tornadoes in a particular state, so although we use density estimation, it would create rift between two individual nearby data values of storms. So, we ended up using point plots.

The data attributes were tried in many ways to be represented but I felt bar charts were the best to visualize them because we had to explain about individual tornadoes and show how different attributes corresponding to them affected

property damage. We deviated from our proposal because initially before writing proposal we had no datasets available to us. Once, we started searching for datasets and making use of them to visualize the considered dataset made us realize we have more important questions to answer using visualization then the once we identified when submitting a proposal. We said we would be showing how different natural calamities affect United States County wise, but we couldn't find related datasets.

Analysis:

The data attributes in data set gives us information about different scales of tornado that affected United States in different times. Their corresponding width, length are also visualized. These visualizations are more used to obtain property damage caused by individual tornadoes. We can also infer that in every state there's at least one major damage-causing tornado that took place. Using data sets about other natural calamities like earthquakes, floods, and volcanoes can further develop this visualization. Using these data visualizations, one can determine different states in United States that are being affected by individual natural calamities.