Final Project Options:

1) Interactive Visual Analytics dashboard:

Create a dashboard to interact with and visualize features of a dataset

- ✓ Technologies Used: bokeh, plotly
- ✓ Data-set: students choice, we will also suggest a few
- ✓ Deliverables:
  - Jupyter notebook used to create demo and instructions to run demo,
  - Video showing screen-capture of demo
  - 2 page report (introduction to problem, methods what technologies used and why, conclusion)
- ✓ Example:
  - Analyze budjet and finance dataset such in: https://data.austintexas.gov/browse?category=Budget+and+Finance&limitTo=datasets
    You can see an example in the image below.
  - Analyze the health risks facing particular demographics of the United States (Cancer, diabities, drugs, …). Using the information from open databases and python packages(such as plot.ly, bokeh, ..) you will be creating charts and interactive graphs to show inshights of your findings. There are two graphs in the CDC cancer visualization https://gis.cdc.gov/Cancer/USCS/DataViz.html
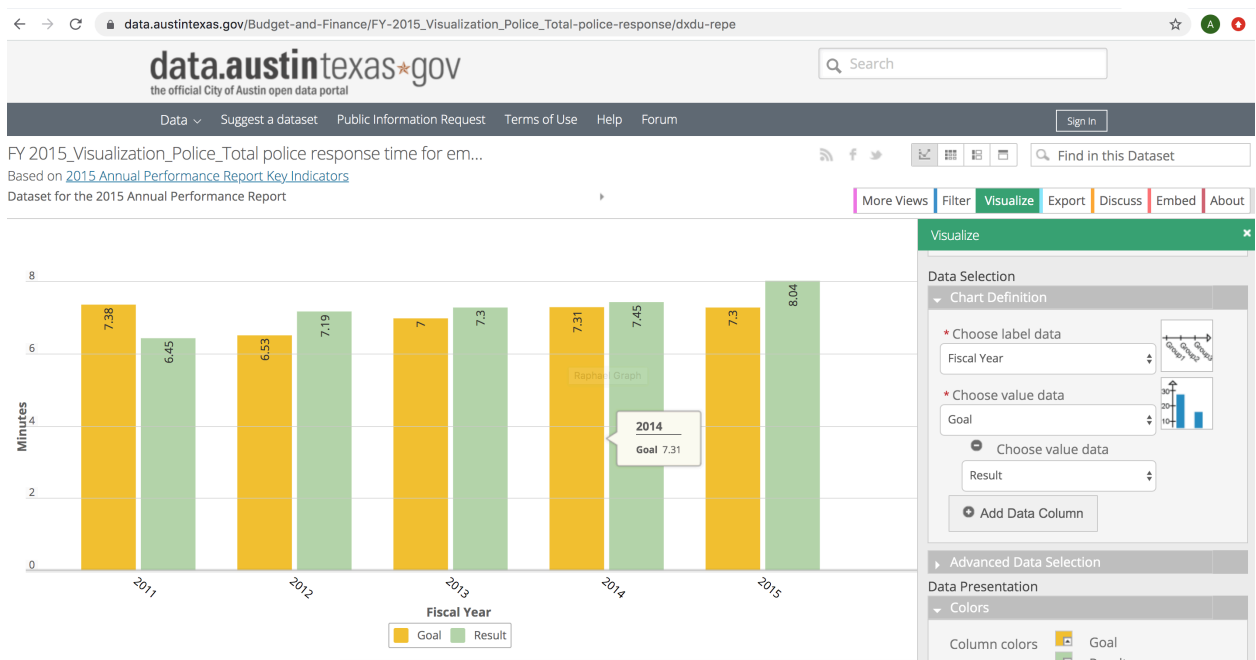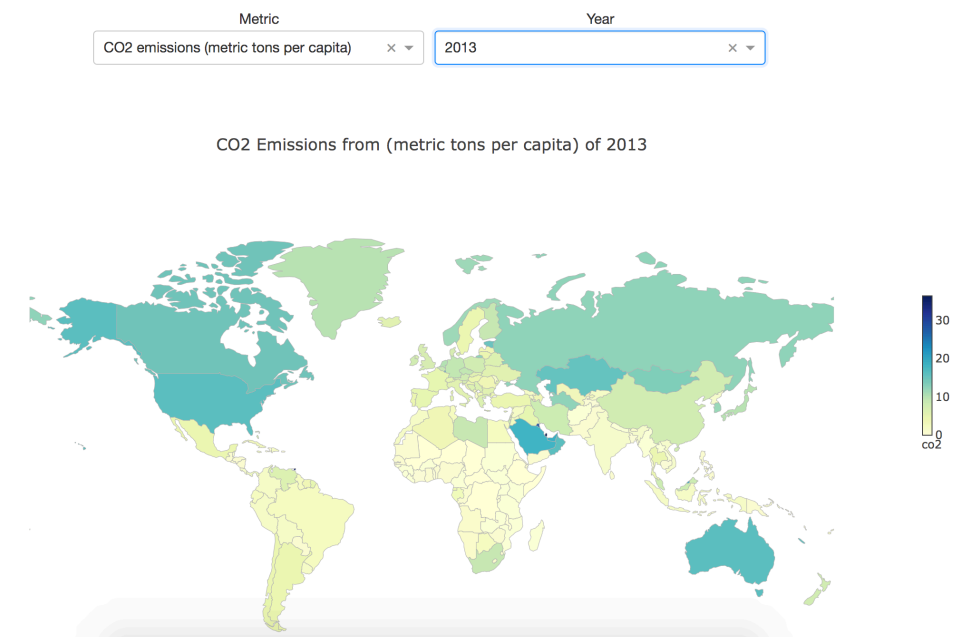
2) Geographic Visualization:

Create an (interactive Vis) to show geolocated data-set

- ✓ Technologies used: qGIS, python
- ✓ Data-set: students choice, we will also suggest a few
- ✓ Deliverables:
    - Scripts used to create visualization and instructions to run demo if interactive,
    - Video showing screen-capture of demo
    - 2 page report (introduction to problem, methods what technologies used and why, conclusion)
- ✓ Example:

    - Create an interactive visualization of weather, water quality, air pollution, historic earthquakes over time (or something else) using geo-mapping libraries. Here is a link for some datasets you can use https://austintexas.gov/department/gis-data
    - For example, If you decided to go with the weather dataset, your final application will provide something similar to the following:

Demographic Data by Country

Metric	Year
CO2 emissions (metric tons per capita)　× ▼	2013　× ▼

CO2 Emissions from (metric tons per capita) of 2013

- Or combine data from the US Census, Google Maps, and Google Places to visualize the relationship between various socioeconomic factors in a given zip code. Here is an exmple: https://gis.cdc.gov/Cancer/USCS/DataViz.html

3) Scientific Visualization:

Create Paraview script (pvpython) to create and render an animation (either time-series, animated parameter e.g. isosurfae sweep, or camera motion) of a scientific visualization dataset that shows 3 different visual elements (e.g. vectors, isosurfaces, clipping plane)

- ✓ Technologies Used: Paraview and pvpython
- ✓ Data-set: students choice (Sci vis techniques are generally applied to gridded data e.g. Computational Fluid Dynamics type, weather, cryoEM or MRI medical data). We will also suggest a few.
- ✓ Deliverables:
  - pvpython script
  - final movie
  - 2 page report (introduction to problem, methods what technologies used and why, conclusion)
- ✓ Example:
  - For a given data set you will use python and Paraview to programatically create and render a movie that shows (exact options will depend on the data-set) 1) isosurface sweep 2) vector flow over time 3) animated clipping plane 4) animated camera through a scene. You may also use python visualization packages to generate plots to show statistics (tbd based on the dataset but perhaps a histogram or some other useful plots) that answer scientific questions about the data (tbd based on dataset). The report should include a discussion of data format considerations, resource justification for rendering and data processing (based on size of data-set) and self-critique of design choices.
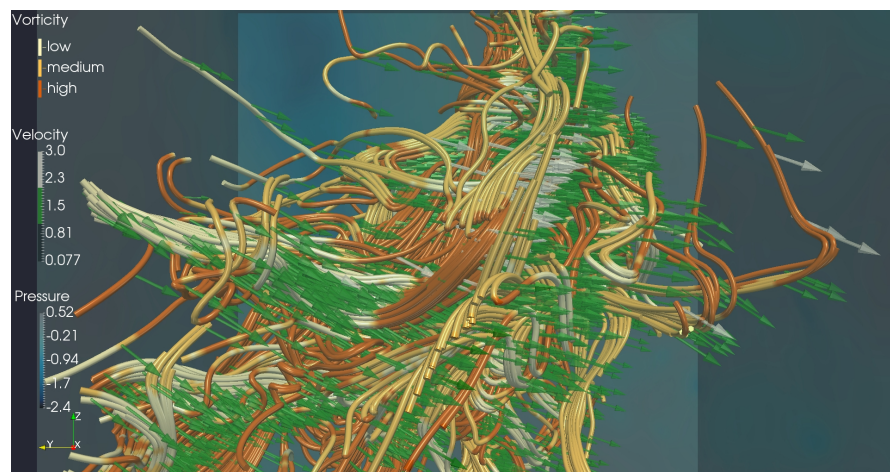
Grading will be based on:

Use of python (commented so we can tell what you are doing) and visualization packages to clean-up, analyze and visualize a data-set.

Use knowledge of visualization best practices and perceptual guidelines when creating the visualization.

Create an easy to understand demo and report.