USA Exports and Imports with US Census Foreign Trade Data

H517 Visualization Design, Analysis, & Evaluation

Team:

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Project Description:

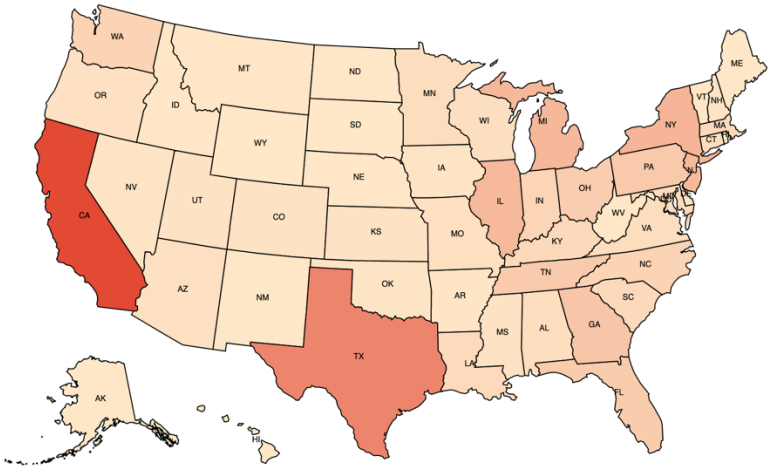
This project is about analyzing the US census trade data which contains all the imports and exports related information of all states in the USA. Particularly, it shows the different commodities that are traded, and also the value (In millions of dollars) of the trades. The dataset can be found here

The dataset provided in the above link shows the information using excel sheets only. Since this is a huge amount of data, we realized that the data can be presented in a much clear way using the different visualizations and d3.js technology. Initially, we started our project using 3 important questions which we all were intrigued about. They are:

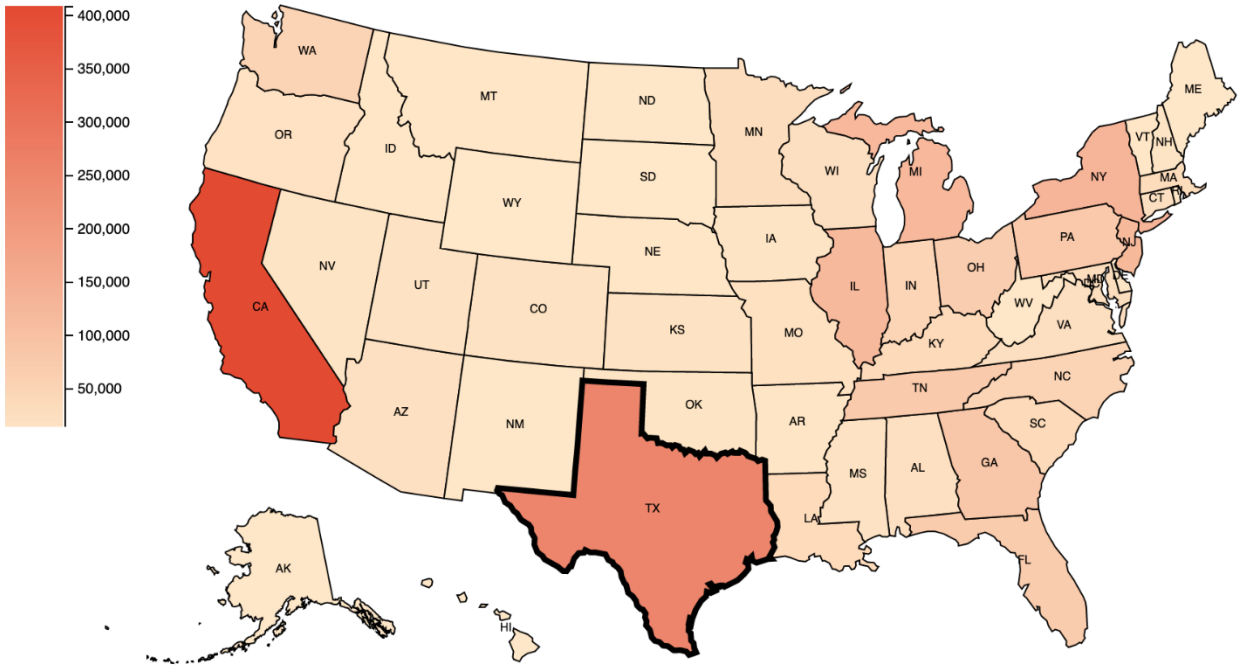
1. How do the imports and export quantities differ for each state?
2. What are the top 5 exports and imports of different states?
3. How the imports and exports of states have changed from 2015 to 2018?

In the next step, we explored various ways of visualizing data for different states. We realized that using Geospatial maps can be a great way of showing information of all states at once. Later, for each of the 2 other questions, we decided to use pie chart for top 5 exports and imports, and line chart for imports and exports changes.

For the Geospatial map, we used the color schema of sequential maps from color brewer website. The output is as below.



To improve usability, we decided to add 2 things to the graph. Firstly, highlight the selected state by increasing the stroke width. Secondly, add a scale that shows the range of values of all states in the geospatial map. The final output where 'Texas' state is selected is shown below.



We also decided to give the users to change the trade and year as they desire and see the visualizations accordingly. We tried to keep this as simple as possible using simple html radio buttons. The output is as below.

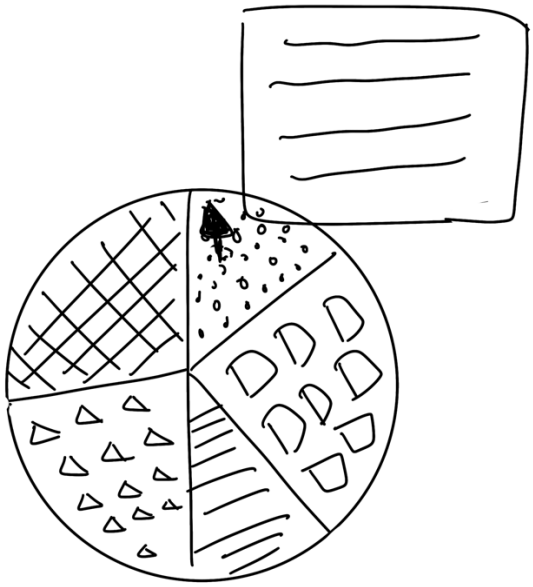
Select Import/Export

- (●) Import
- ( ) Export

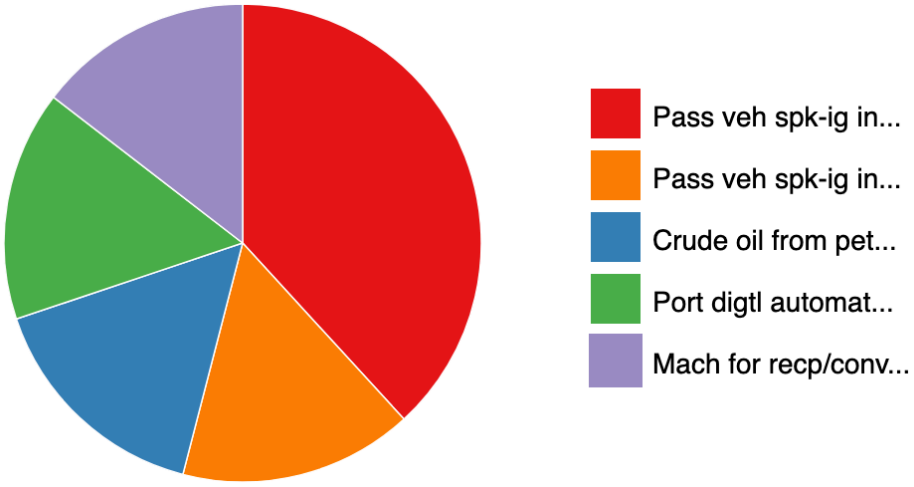
Select Year

- (●) 2015
- ( ) 2016
- ( ) 2017
- ( ) 2018

To answer the 2nd question, we initially planned to just create a pie chart and show the information when hovered. The sketch is as below.

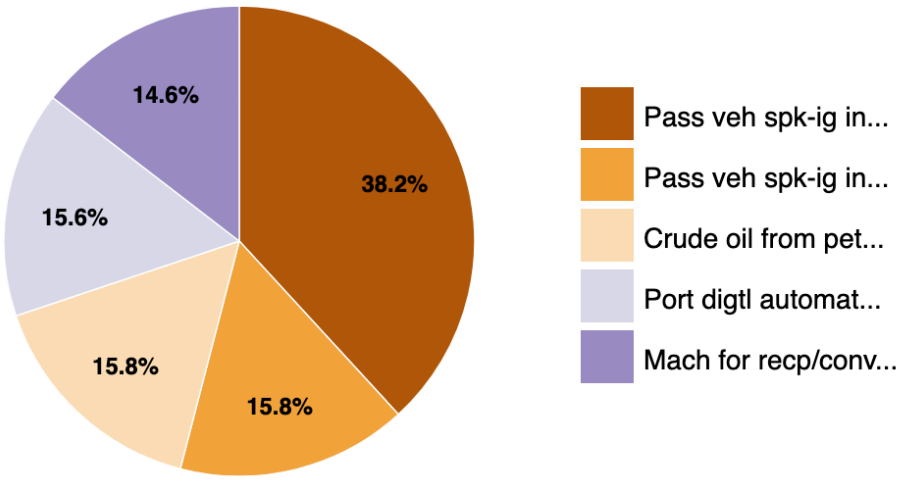


However, after our review we realized that it is not user friendly, as the user is forced to hover over the chart to see more information. Hence, we recreated the graph as below.

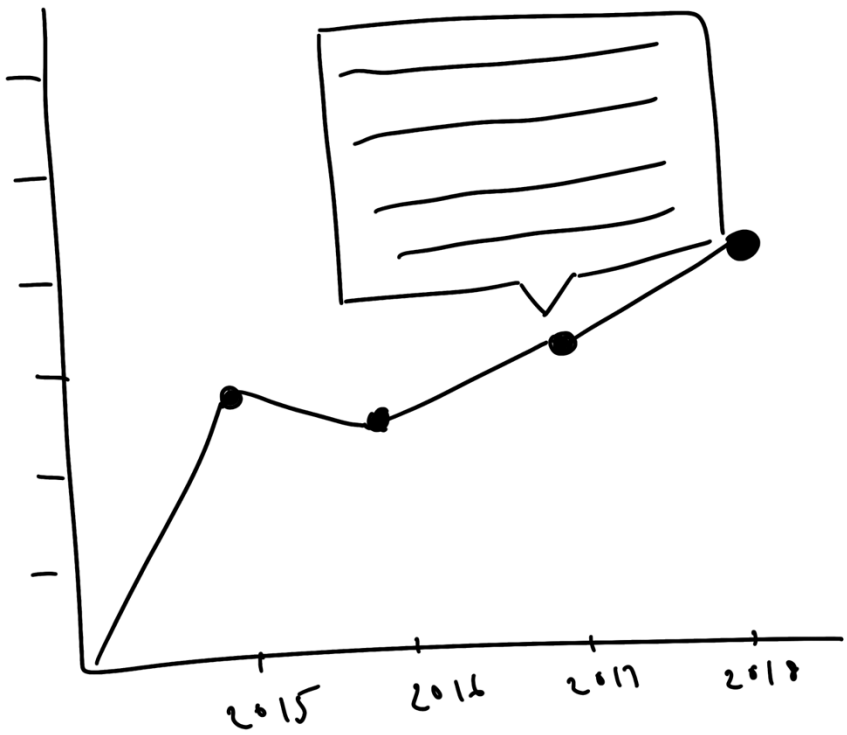


After this, we also performed a color-blind simulation with the tool “Sim Daltonism”. We found that the colors we chose are not web safe and not friendly to everyone. Hence, we changed the

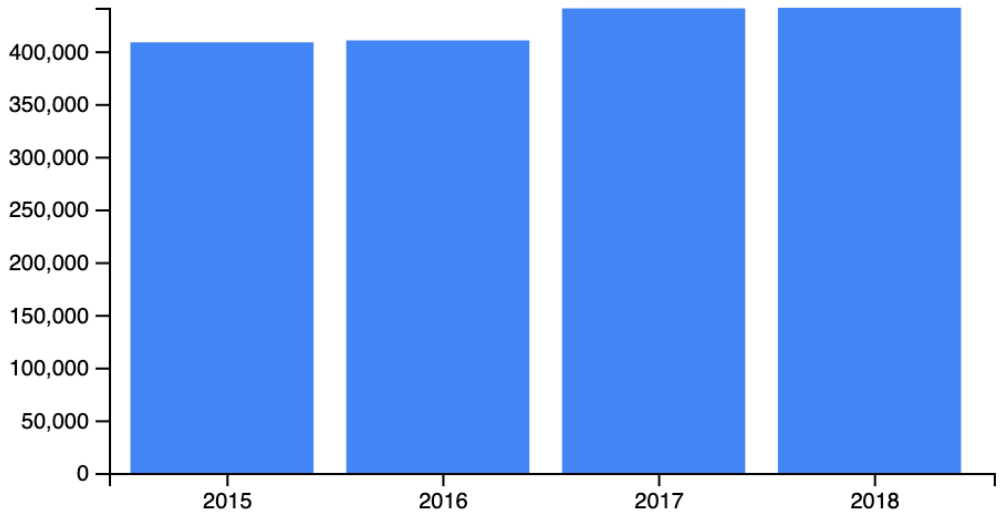
colors using color brewer online tool and also added the percentages on each sector of the pie chart. The new pie chart is much more friendly and gives more information about each component of the pie chart without forcing the user to hover. The final output is as below.



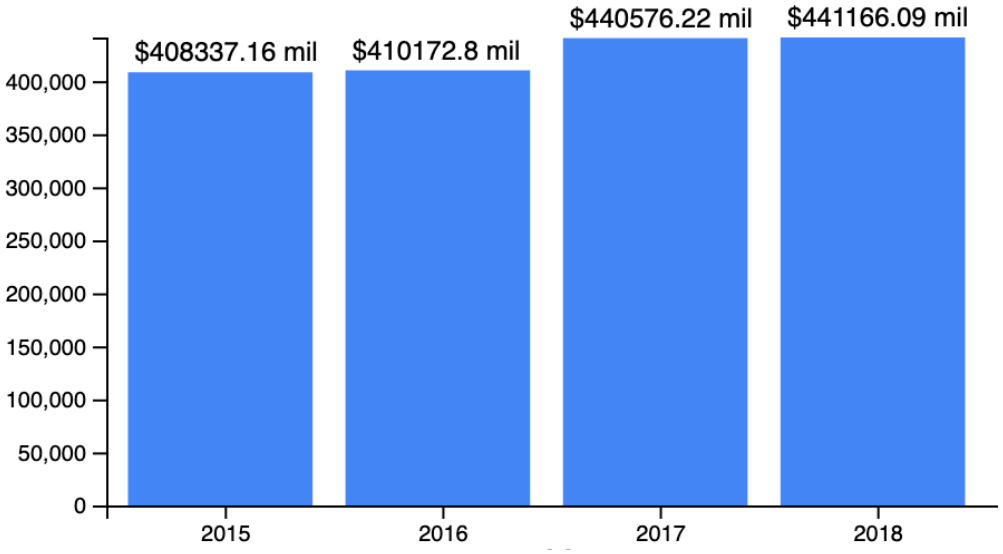
Later we started working on the 3rd question. As planned, we sketched a line graph which we planned to implement in d3.js. The line chart would have 4 points on graph indicating 4 different years. When the user hovers over the point, it gives more information about the trade in the year. Our initial sketch is as belo



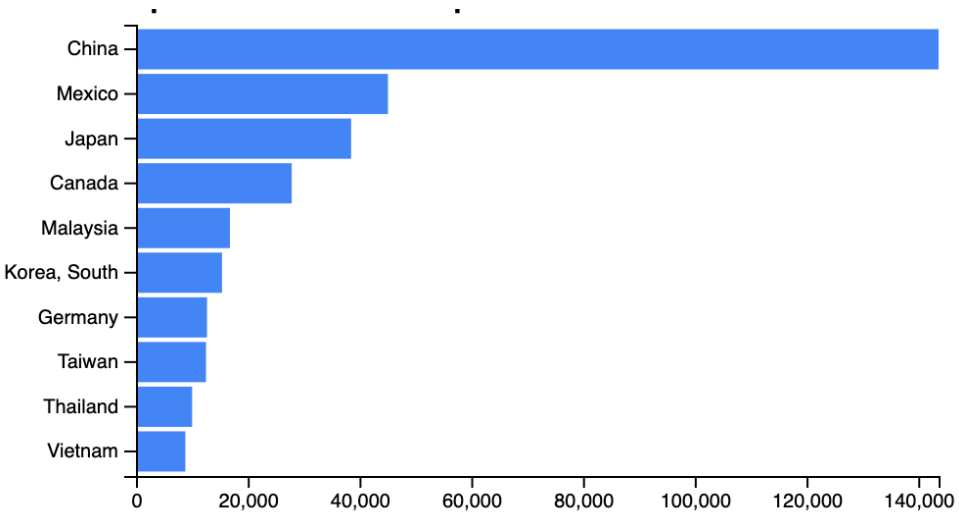
Later, we realized that forcing the user to hover on a small point in the graph to obtain more information is not user friendly. Hence, we decided to go with bar graph where the user would have much more area to hover and get information about that year. We chose the color which Google uses for their bar charts as we found that it is color-blind safe after testing it with our simulation tool. The initial bar graph is as below.



Later, we also made improvements on the graph by adding the value of each year on the top of bar graph. The final result is as below.



While working on this project, we also were intrigued by another question, i.e., 4. What are the top 10 countries that import/export to different states of USA. We decided to answer this question by making another visualization. We all agreed to make a horizontal bar graph to achieve this. We also used same color schema as in the previous bar graph. The final output is as below



References:

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3. https://bost.ocks.org/mike/map/
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6. https://bl.ocks.org/d3noob/bdf28027e0ce70bd132edc64f1dd7ea4
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