

CS 6630 - Project Proposal

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Basic Information

Project Title - Visualization of Economic Data affecting Petrol Prices

Project Repository - <https://github.com/thatA7MAD/CS6630-project>

Team Members -

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Background and Motivation

Crude oil, also known as petroleum, is a naturally occurring liquid mineral that is the primary source of fuel for automobiles and, in some parts of the world, heating oil. The world used or consumed approximately 88.7 million barrels of oil per day in 2020. This figure represents a decrease in consumption when compared to previous years, and it is attributed to the COVID-19 pandemic.

The top ten oil consumers account for roughly 60% of total global oil consumption, with the rest of the world accounting for roughly 40% of total global oil consumption. The United States is both the world's largest producer and consumer of oil, mining approximately 11.5 million barrels per day and consuming more than 17 million gallons per day—more than the entire European Union (9.8 million). This amounts to about 15-20% of total global oil consumption. China consumes 14.2 million barrels of oil per day, followed by India, which consumes approximately 4.7 million barrels per day. The United States, China, and India account for more than one-third of global oil consumption.

Also, it is important that the petrol prices have become a global concern in the past few months. The gas prices have reached record-breaking highs and in the US, the national average per gallon sits at \$5.

There are several factors that influence the price of gas:

- Crude Oil Prices
- Refining Costs
- Taxes
- Distribution, and marketing costs

We thought it would be interesting to visualize gas consumption because it has become such an essential commodity and consumption in each country is so high and diverse. Although there are numerous similar visualizations available, none of them provide a comprehensive overview of all parameters. The figure in *oilandgasinfo*, for example, shows the percentage of global oil consumption, whereas the figure in *worldpopulationreview* shows only the oil consumption per day by country in barrels. There were only a few good visualizations of global gas prices. So we decided to combine all of the parameters into a single interactive visualization. We combined several datasets to create one with the following parameters: daily oil consumption, world share percentage, price per gallon, and price per liter.

Project Objectives

The objective of this visualization is to tell the story of how much oil is consumed for each country in 2022.

The end goal is for the user to be able to answer these questions:

- How much oil is used globally per day?
- What countries are the top consumers of oil?
- What is the US share of the world's oil consumption?
- How much is a gallon of oil for each country?
- What is the difference in oil prices from country to country or region?

What are our learning goals?

- Drawing a dynamic map using Javascript and D3 library, and using the map to tell a story.
- How to add interaction effects into a visualization design while keeping human cognition and perception in mind (color, saturation, and transparency).

- Use what we have learned in the course to develop a complex effective visualization.

Data

From where and how are you collecting your data?

The data is collected from:

1. [<https://www.kaggle.com/datasets/zusmani/petrolgas-prices-worldwide>].
Petrol/Gas Prices Worldwide by Zeeshan-UI-Hassan Usmani
- 2.

The data is in the following format:

- Country: the country from which oil data was recorded.
- Daily Oil Consumption (Barrels): the amount of oil consumption per day.
- World Share: the proportion of the country's oil consumption per day to world oil consumption.
- Yearly Gallons Per Capita: the total annual gallons per capita consumed.
- Price Per Gallon (USD): the price of a gallon of oil in that country.

Data Processing

Do you expect to do substantial data cleanup?

We don't expect substantial data cleanup or processing needed beyond the following:

- Handling missing data in the datasets.
- Handling map data, converting TopoJSON to GeoJSON.
- Parsing the CSV data based on the user inputs.

What quantities do you plan to derive from your data?

We will be deriving multiple currencies from the USD currency to make the visualization more understandable to people who are used to their country's currency.

How will data processing be implemented?

We will be accumulating data from multiple sources and deriving more columns from the given data to increase the number of options in the drop down menu. In addition, we

will get more economic data which influences the petrol pricing and make the visualization more comprehensive.

Visualization Design

Prototype 1

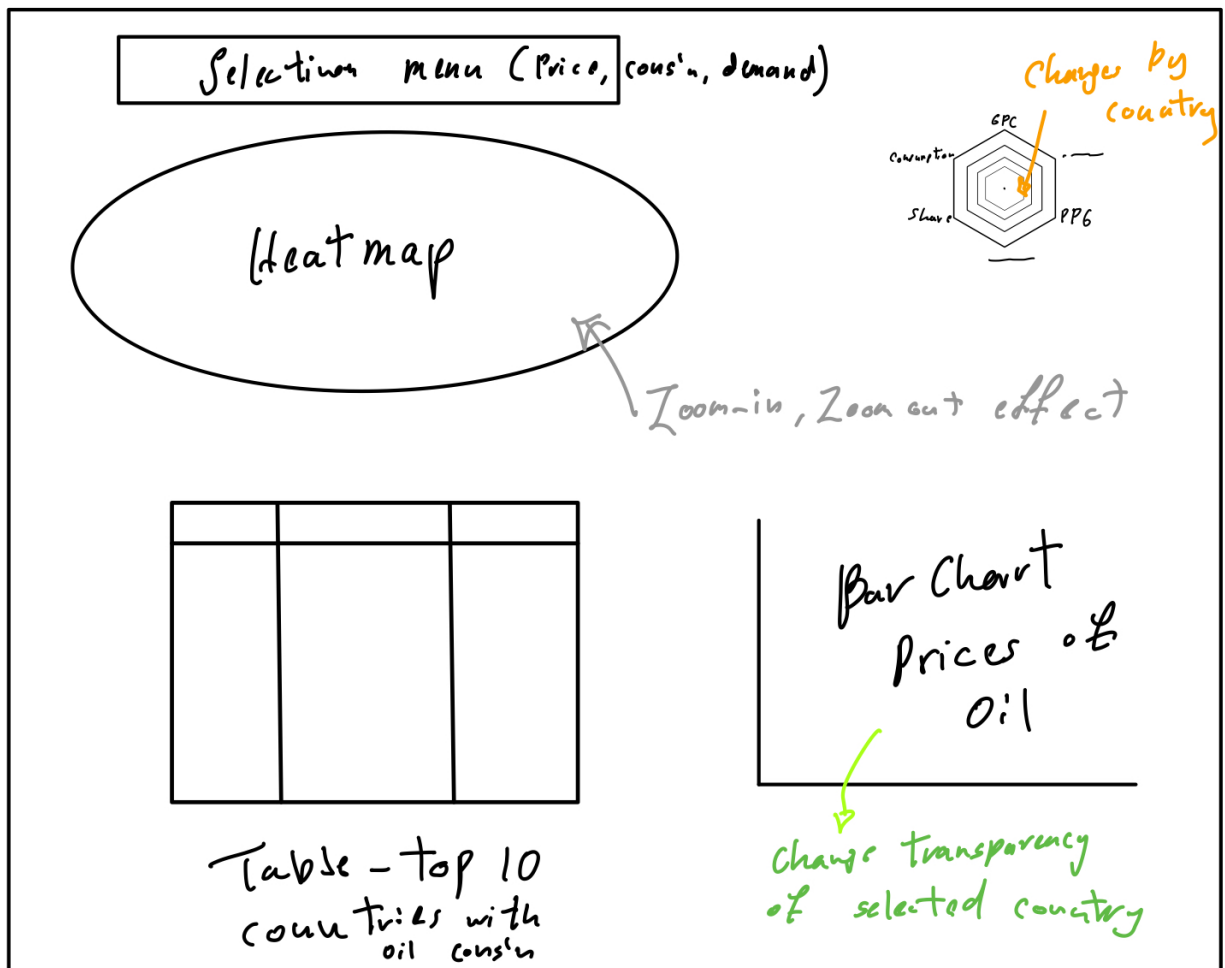


Figure 1: Prototype 1

- The global heatmap is in WinkleTriple projection to minimize area, distance, and angle distortions.
- The selection menu includes radio buttons to select a different scale (price, consumption, or YGPC) on the map, with a pre-selected option.

- The radar chart displays a selected country's data from either the heatmap or the barchart, with the option to add more selected countries for comparison.
- The table includes the countries with their data, and a selected country from the map should be displayed and highlighted in the table.
- The bar's length in the bar chart represents oil prices for each country and so the user can determine which country has the highest oil price.
- The bar chart should highlight the selected country from the heatmap and set the other bars transparent.
- The bars in the chart could be colored according to their country's YGPC as the length represents the price of oil.

Prototype 2

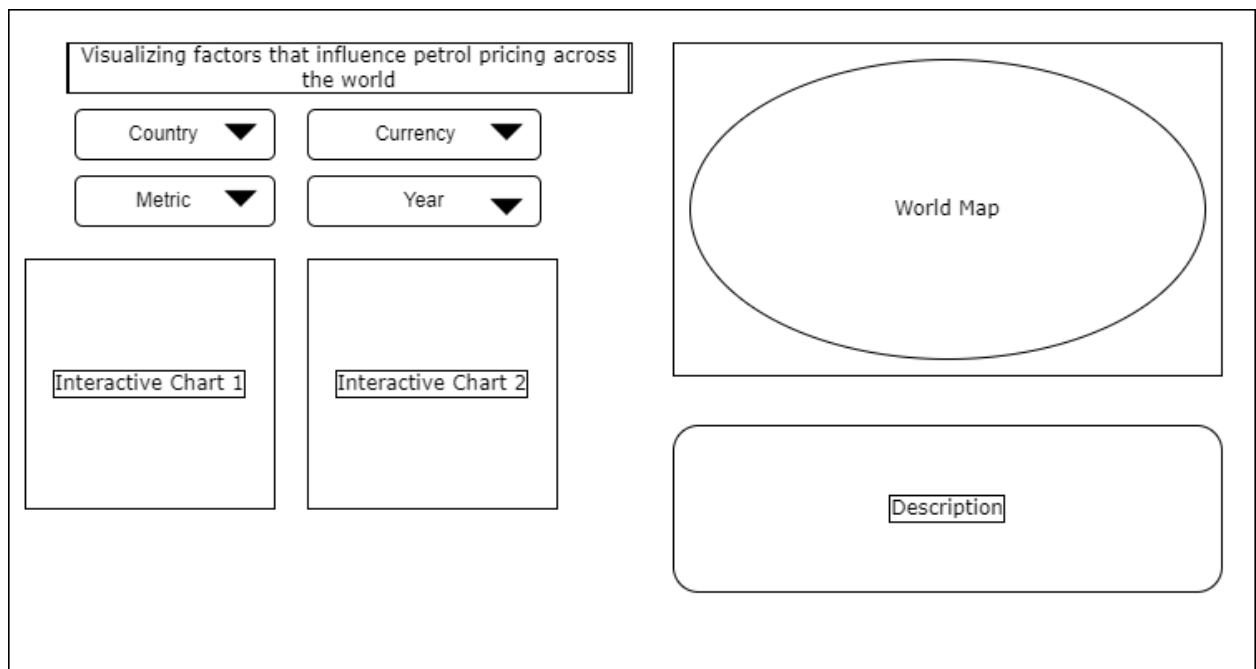


Figure 2: Prototype 2

- Drop-down selection is used because it helps conserve screen space.
- Interactive charts update on clicking a particular country on the world map.
- Using Leaflet, the map should support zooming-in and zooming-out features.

Prototype 3

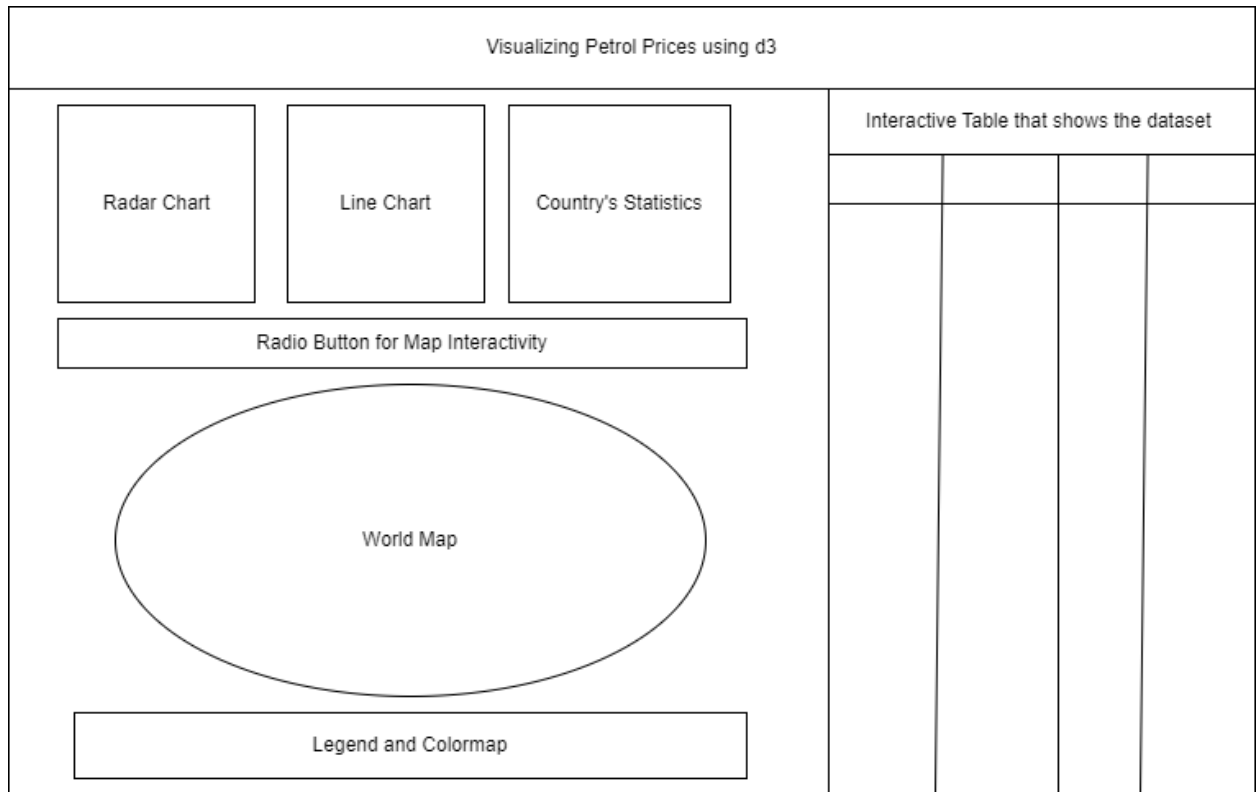
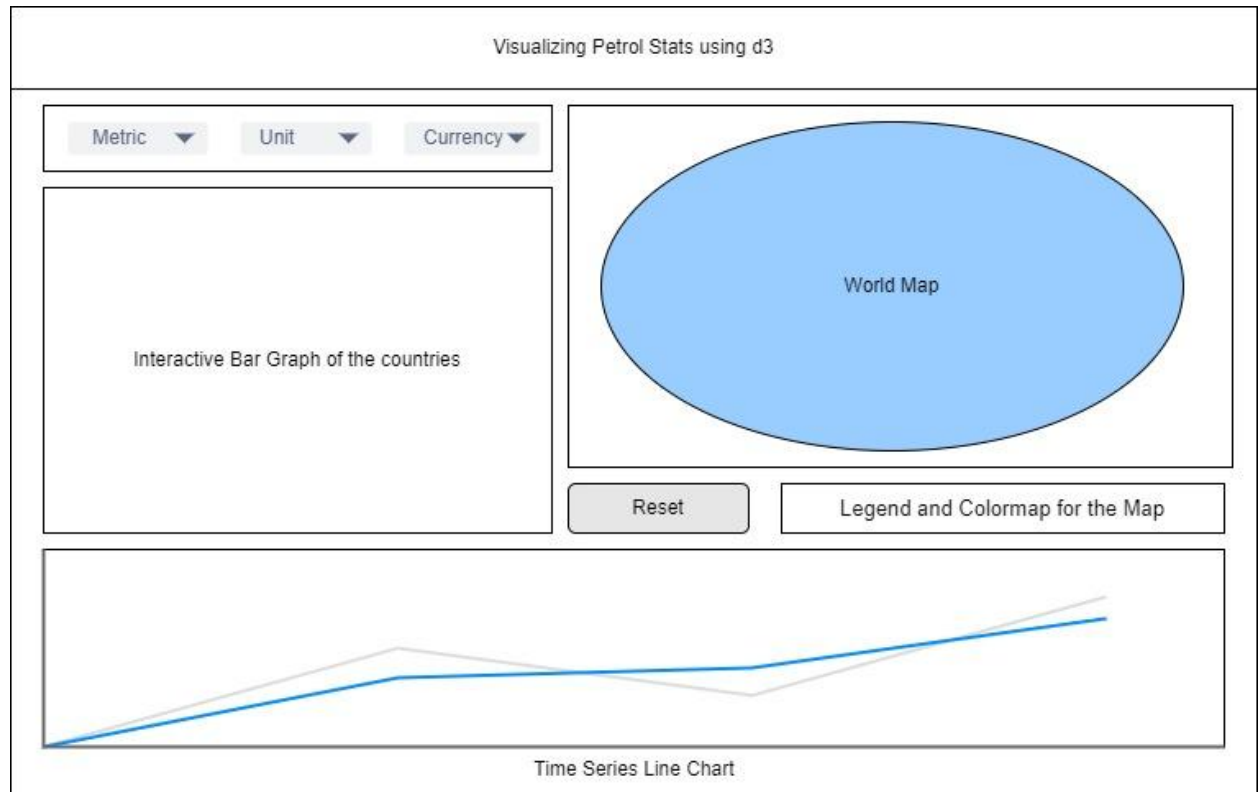


Figure 3: Prototype 3

- This prototype supports sorting countries on the interactive table according to the name, gas price, population, gdp, etc.
- The radar chart is used to compare two different countries' statistics.
- Top 10 and bottom 10 countries on the Line Chart, Country's statistics, etc.

Final Design



- The drop down menus include:
 - Metric: The metric drop down has multiple options to choose from, like price per gallon, daily oil consumption, world share, yearly gallons per capita, etc.
 - Unit: The unit of measurement of gas, Gallons or Liters, default value is Gallons.
 - Currency: The currency for which the data is to be displayed, default value is USD.
- The time series plot will include lines for each selected country from the world map.
- The bar graph and the line chart will show the top 5 countries by default.
- The “Reset” button will deselect all selection from the world map
- The global heatmap is in WinkleTriple projection to minimize area, distance, and angle distortions. It will be updated based on the input from the drop down menu selections. We will use an interactive map API(leaflet/GoogleMaps API).

Must-Have Features

- An interactive world map
- Multiple drop down menus which would facilitate searching something specific
- Interactive Bar Graph and Line Chart that updates upon selection of a country on map.

Optional Features

- Historical year wise data of gas prices for each country
- Radar Plot for comparing multiple countries
- Visualizing secondary factors that influence gas prices like GDP, Imports, Exports, and other economic data.
- Country's name, flag, population, capital city, etc. will show up on selection.
- A heatmap that shows the change in gas prices.

Project Schedule

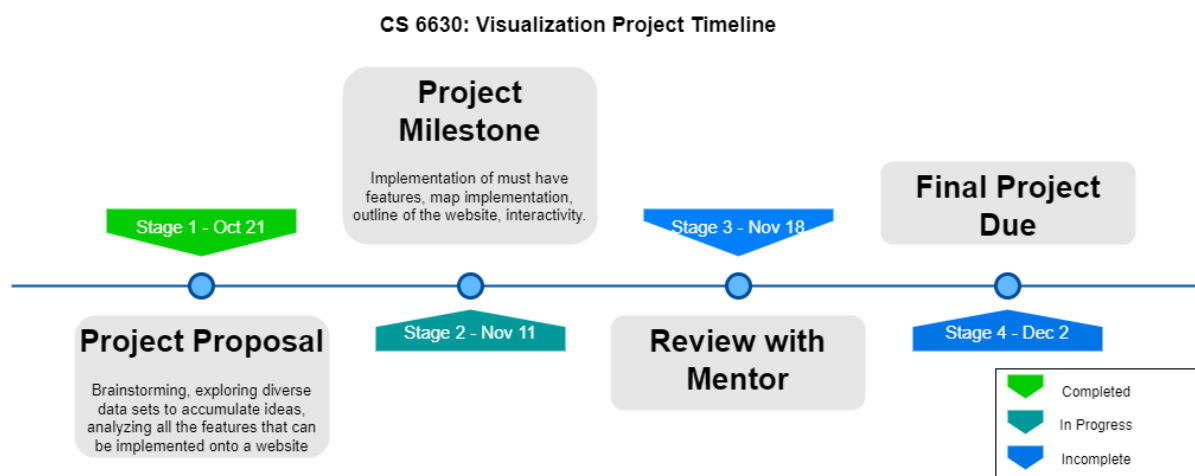


Figure 4: Project Schedule