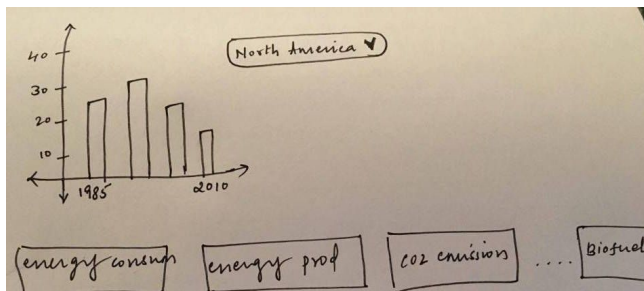
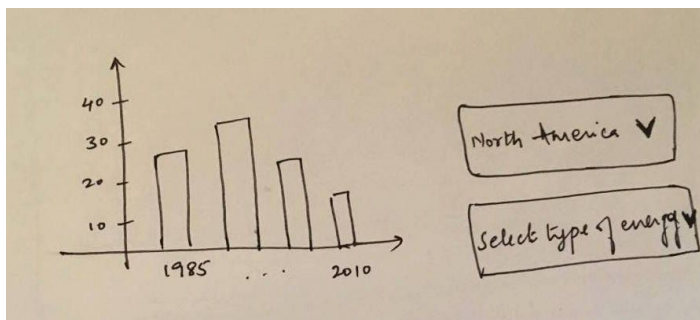


Design Process

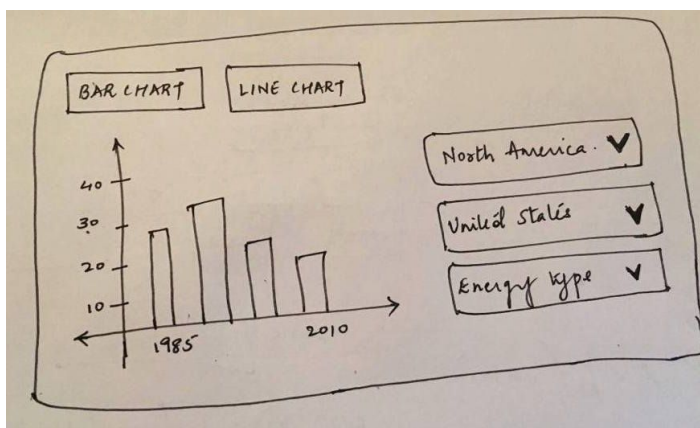
I started out by identifying the dependent variables in the dataset. After which, I plotted the energy produced for all the years using a bar chart. I started out by plotting the bar chart for one given country (North America). Followed by other countries with the ability for the user to switch between them. I wanted the user to have the ability to switch between the 13 variables given in the data set. My initial design decision was to include 13 variables located as tabs placed at the bottom to give the user the ability to switch between them (*refer sketch*).



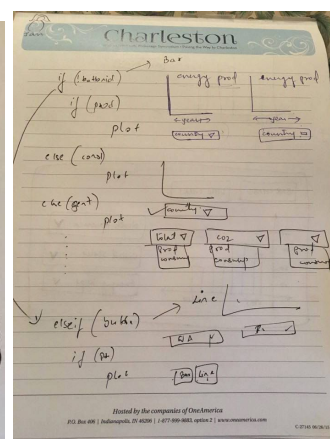
Iteration 1



Iteration 2



Final Version



Logic to loop through the 13 variables

However, giving the user 13 options to choose from cluttered the UI and therefore, increased their cognitive load. To reduce the cognitive processing, I segregated the 13 variables logically into dropdown menu options (multi scale visual structure) for energy produced and energy consumed for each of the variables (*refer sketch 3*). Doing this reduced the number of components on the screen and increased the structural consistency which gives the user an effective way to navigate through the data. My initial version required the user to switch between a line chart and bar chart by simply clicking anywhere on screen; the chart type would switch from bar to line and vice versa. However, since there was no visual cue informing the user of the ability to switch between the two type of charts, it was not intuitive. To overcome this, I included tabs in the UI to indicate the option to switch between the bar chart and line chart.

We use visual queries to identify patterns in our environment. These queries serve as triggers to the visual system that aid the process of perceiving. This information is further processed to make sense of the visualization. The use of bar chart allows the user to observe the trends in energy production and consumption from the year 1985 to 2012. The two dependent variables: - energy produced/consumed and the year in the dataset showcases the relationship between the units produced for each country. By giving the user the ability to switch between the countries, they can compare the energy trends for each country.

The use of color in the line chart was to aid the visual distinctness and learnability of the entities being color coded. Using color coding, the two colors (*i.e. red and blue*) distinguish values between the two countries. Since they are placed on different channels they aid in visually querying the data points. This reduces the cognitive load required to find patterns and subsequently allows the user to simply focus on information processing. The color choice was also made after taking into account the contrast between them to allow a easily distinguishable symbol set. Finally, the use of text along with the graphs gives the users context about the kind of data being displayed. Therefore, each graph is labelled with the appropriate x and y-axis units of measure combined with an overall description clearly demarcating the type of energy being displayed.

In case of the bar chart, its size relates to the magnitude, quantity and importance of energy trends in any given region. The line chart allows for queries to find the highest point, the lowest point and the overall slope of the line i.e. up or down in energy trends. Currently, the bar chart has the years from 1985 to 2010 on the x-axis, and values of energy production/consumption on the y-axis. With the bar chart, the user can switch between the different types of energy produced or consumed for each of the countries.

We see that Dominican Republic is a consumer for coal, but does not produce coal. Uruguay follows the same trend. We can also see that the coal production of Cameroon was stable from 1985 until 2000 and stopped thereafter. With the line chart, when you select CO2 emission for Central & South America and Cyprus, it is clearly visible that the emission for Central and South America is higher than Cyprus. From the line chart it is also clear that the CO2 emission reduced to 0 in the period 2005. With a quick Google search, I found that one of the reasons the Co2 emission reduced in Cyprus was because of the implementation of program promoting energy saving, Promotion of small cars in urban transport, Fuel switch from diesel to LPG in taxis and Promotion of public transport.

Link to the video: - <https://youtu.be/88-TUZeVwHo>

Link to the project: - <http://localhost:8888/project1/index.html>