Assignment 3b:

Build your own Climate Change Dashboard

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1. Pre-processing: Collection and Cleaning of Data

○ The data was collected from the World Data Bank which summarizes all the factors and elements that have caused Climate change and this data is provided for all the countries from the year 1960 to the year 2020.

○ We have used another dataset as well which depicts the temperature change all over the world as an impact of the climate change from the beginning of 1743 till 2014. This is a time-series data so, it contains the data for each day for each of the known countries.

○ The data cleaning consists of some brief processes as follows:

   i.   Removal of repeated data or duplicates.
   ii.   Formatting of the year attribute.
   iii.   Removal of useless columns from the dataset such as Country Code and Series Code.
   iv.   Removal of the last two rows which information about the dataset such as date and source of the dataset(for the climate change dataset).
   v.   After this the NaN values are removed.
   vi.   Now, both dataset is good to go.

2. Analyzing the Climate change using the dashboard:

○ Climate change can be understood and analyzed by focusing on the root causes of climate change. The climatic change is mostly caused by the greenhouse gases like CO2 and Methane. Apart from this, there are multiple different factors causing climate change.

○ We have used the dashboard to plot some of the most prominent factors causing climate change.

○ Also, we have plotted two plotly plots side by side for all these factors to get a comparative study for two countries. Initially, we have set it to India vs Japan. This can be changed using the drop-down menu at the top.

○ In the end, we have plotted the climate change plot for the whole world which contains data for each of the countries separately and the other plot below that is the average temperature over the years can be clearly seen to be increasing at an alarming rate.

○ The following dash dependencies have been used to create the dashboard:

    i.   Dash: for initialization of the dash application
   ii.   dash_core_components(dcc): for the creation of interactive graphs, dropdown menus, and various animation
  iii.   dash_html_components(html): for including html in the python code

3. Addition of the interactive plots

○ First, we make the two dropdown menus that will control the data in the plots below.

Climate Change Dashboard

Select two countries from the dropdown menu for comparative study side-by-side

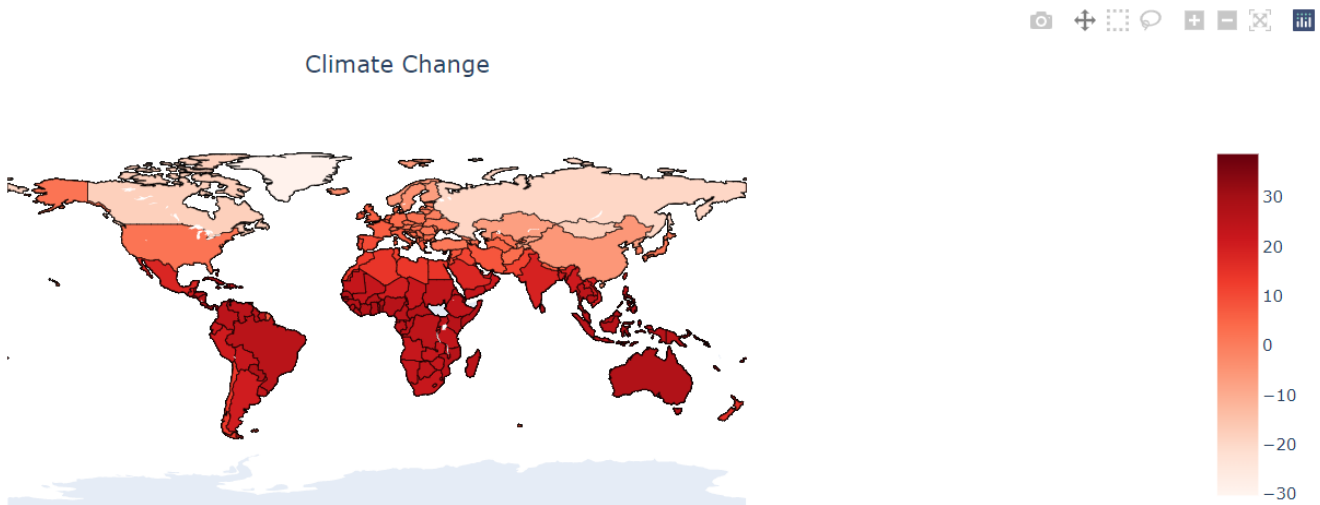| India | ▼ | Japan | ▼ |

○ This is followed by the two interactive plots side-by-side depicting the factor causing climate change. This is done for nine different factors which are considered most impactful in climate change.
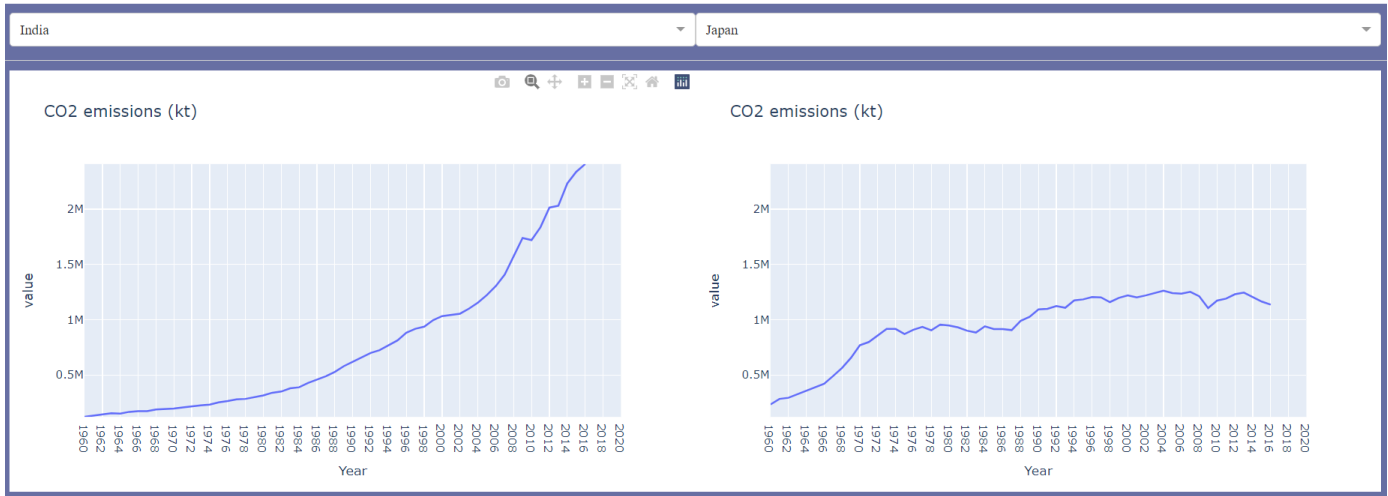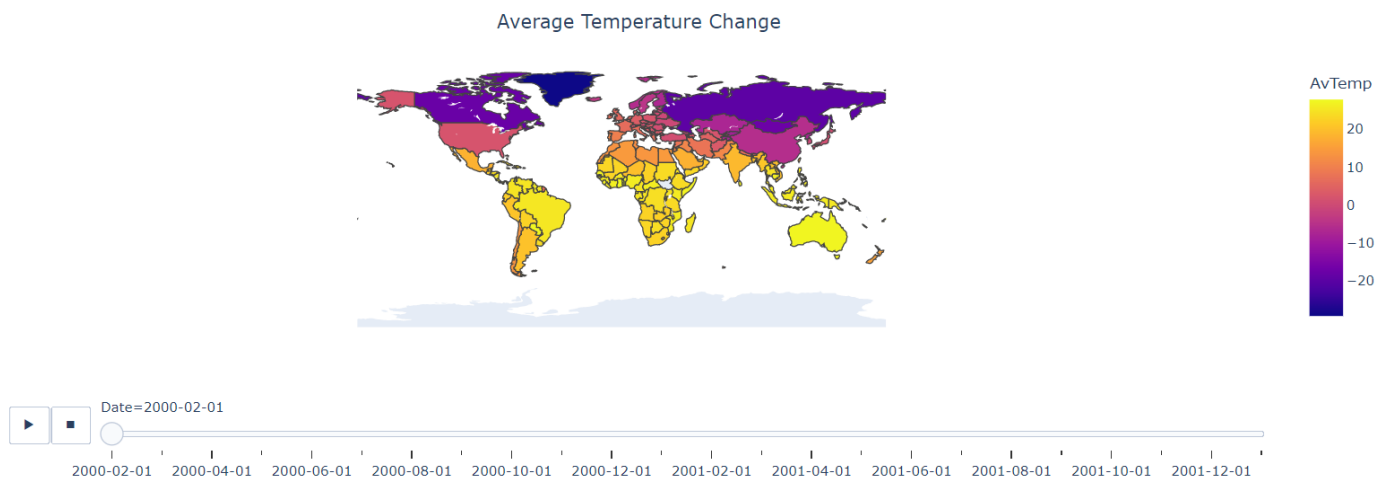

○ After this, we have plotted the world map plots as a whole to depict the climate change in the world.

World Map Plots

○ Finally, we have plotted the temperature change as a result of the climate change across the globe, this plot has been made for a period of two years to depict the seriousness of climate change. We can observe the rise in the average temperature across different countries by giving a look at the animation of the plot for just this two-year period. The animation can be started by pressing the play button below.

Average Temperature Change

Date=2000-02-01

| ▶ | ■ | 2000-02-01 | 2000-04-01 | 2000-06-01 | 2000-08-01 | 2000-10-01 | 2000-12-01 | 2001-02-01 | 2001-04-01 | 2001-06-01 | 2001-08-01 | 2001-10-01 | 2001-12-01 |

4. Steps and Instructions to run the code

● We have used a virtual environment to initialize and do the project so, that can be done using the following command in cmd:
   ○ `virtualenv env`

● Now that the environment is made, the requirements.txt file can be run to install the required dependencies at once. So, run :
   ○ `pip install requirements.txt`

● Now, the main file is ready to run. So, run the command:
   ○ `python main.py`

```
(env) C:\Users\anupa\Desktop\DAV_Assignment3b\Assignment_3b>python main.py
Dash is running on http://127.0.0.1:8050/

 * Serving Flask app 'main' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
```

- The URL where the dash application is running will be shown after that. So, head over to that link and access the webpage.