Lab 10. Analysis of GDP dataset

i) Visualize the countries data given in the dataset with respect to latitude and longitude along with country name using symbol maps.
ii) Create a bar graph to compare GDP of Beigium between 2006-2026.
iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singapore by the year 2010.
iv) Visualize the countries Bhutan & Costa Rica competing in terms of GDP.
v) Create a scatter plot or circle views of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006.
vi) Build an interactive dashboard.

Introduction

This program is designed to guide users in analyzing GDP data using Microsoft Power BI, a versatile business intelligence platform. It focuses on enabling users to explore and visualize GDP trends across different countries and years, offering valuable insights into economic patterns and comparisons between nations.

The program uses a comprehensive dataset containing details such as country names, geographical coordinates, GDP values, and regional classifications. Students will learn to create various visualizations, including symbol maps, bar charts, pie charts, scatter plots, and interactive dashboards, to uncover meaningful insights and trends.

Objectives of the Program

- Visualizing geospatial data using symbol maps.
- Comparing GDP trends over time with bar charts.
- Representing proportions with pie charts.
- Understanding relationships through scatter plots.
- Crafting interactive dashboards for dynamic analysis.

Dataset Description

The dataset provided in this program contains key information about GDP values for different countries across several years. It includes columns for.

- Country Name: The name of the country.
- Latitude: The geographical latitude of the country for geolocation purposes.
- Longitude: The geographical longitude of the country for geolocation purposes.
- Year: The year of the recorded GDP data.
- GDP (in USD Billion): The GDP value of the country, measured in billions of USD.
- Region: The geographical region or continent the country belongs to (e.g., South Asia, Europe).

The data is structured to allow for multiple types of visualizations and comparisons, especially focusing on countries like Belgium, India, Nepal, Mexico, and Costa Rica, among others.

Dataset

Country Name	Latitude	Longitude	Year	GDP (in USD Billion)	Region
Belgium	50.85	4.35	2006	455.12	Europe
Belgium	50.85	4.35	2011	470	Europe
Belgium	50.85	4.35	2016	500	Europe
Belgium	50.85	4.35	2026	570.89	Europe
India	20.59	78.96	2010	1658.91	South Asia
Nepal	28.39	84.12	2010	24.74	South Asia
Romania	45.94	24.97	2010	166.3	Europe
South Asia	23.22	80.59	2010	500	South Asia (Region)
Singapore	1.35	103.82	2010	236.5	Southeast Asia
Bhutan	27.51	90.43	2010	1.5	South Asia
Bhutan	27.51	90.43	2015	2.12	South Asia
Bhutan	27.51	90.43	2026	3.89	South Asia
Costa Rica	9.93	-84.09	2010	35.62	Central America
Costa Rica	9.93	-84.09	2015	56.44	Central America
Costa Rica	9.93	-84.09	2026	113	Central America
Mexico	23.63	-102.55	2004	674.23	North America
Algeria	28.03	1.66	2004	114.68	Africa
Fiji	-17.71	178.07	2004	3.69	Oceania
Estonia	58.6	25.01	2004	14.21	Europe
Mexico	23.63	-102.55	2006	720.1	North America
Algeria	28.03	1.66	2006	120.4	Africa
Fiji	-17.71	178.07	2006	4.1	Oceania
Estonia	58.6	25.01	2006	16.5	Europe

i) Visualize the countries data given in the dataset with respect to latitude and longitude along with country name using symbol maps.

Symbol Maps

A **Symbol Map** is a powerful geospatial visualization tool used to represent data points geographically on a map. It displays data in the form of symbols (such as circles, squares, or custom icons) that are placed over specific geographical locations defined by latitude and longitude coordinates. In business intelligence tools like **Power BI**, Symbol Maps are used to visualize spatial data, showing patterns, trends, and comparisons across different locations.

Creating a Symbol Map in Power BI for GDP Visualization

To visualize the geographical distribution of GDP across countries using a Symbol Map in Power BI, follow these steps.

1. Open Power BI and Import the GDP Dataset

- **Launch Power BI Desktop** on your system.
- **Import Data**: To start, you need to load the GDP dataset into Power BI. If your data is stored in an **Excel** file, a **CSV** file, or any other supported data format, you can easily import it by selecting the "Get Data" option from the Home ribbon and choosing the appropriate data source.

Example: If you're using Excel, you would choose **Excel** from the available options, navigate to the file, and select the sheet containing your GDP data.

- Once the data is loaded, you should see it in the **Fields Pane** on the right side of Power BI.

2. Add a Map Visualization

- After importing the dataset, go to the **Visualizations Pane** on the right side of Power BI. Look for the **Map visualization** icon. This will typically appear as a globe symbol.
- **Click on the Map icon** to add a blank map to the report canvas.

3. Drag Latitude and Longitude into the Map Visualization

- **Find the Latitude and Longitude Fields** in the **Fields Pane** on the right (from the dataset you imported).
- **Drag the Latitude field** from the Fields Pane and drop it into the **Latitude** section of the Map visualization in the **Visualizations** pane.
- **Drag the Longitude field** from the Fields Pane and drop it into the **Longitude** section of the Map visualization.

    - These two fields define the geographic location of each country on the map.
    - Power BI will automatically plot the data points at the correct locations using the latitude and longitude values for each country.

4. Set Country Name as the Tooltip

- **Tooltips** allow you to display additional information when you hover over a symbol on the map.
- **Drag the Country Name field** from your dataset and drop it into the **Tooltips** section of the Map visualization (within the Visualizations pane).

    - Once this is done, whenever you hover over a symbol (representing a country), Power BI will display the name of the country as part of the tooltip information.
    - This helps users quickly identify which country each symbol represents on the map.

5. Add GDP (in USD) to the Size Field Well

- **GDP Field**: Now, to scale the symbols based on GDP, you need to use the **GDP (in USD)** field from your dataset.
- **Drag the GDP (in USD)** field and drop it into the **Bubble Size (Select Average of GDP)** section in the Visualizations pane.

    - The **Size** field determines the size of the symbols on the map based on the value associated with that field (in this case, the GDP value).
    - Power BI will automatically scale the size of each symbol in proportion to the GDP of each country. Countries with a higher GDP will have larger symbols, and those with a lower GDP will have smaller symbols.
    - This allows you to visually compare the relative GDP of countries: bigger circles represent countries with higher GDP, and smaller circles represent countries with lower GDP.

ii) Create a bar graph to compare GDP of Beigium between 2006-2026.

What is a Bar Graph?

A **Bar Graph** (also known as a **Bar Chart**) is a chart that uses rectangular bars to represent data. The length or height of each bar corresponds to the value of the data it represents. It is typically used to compare values across categories. Bar graphs are ideal for showing trends over time, comparisons between different groups, or frequency distributions.

Bar Graph to Compare Belgium's GDP (2006-2026)

A **Bar Graph** is a powerful visualization tool used to compare different categories or values across discrete intervals. In this case, we are using a bar graph to compare Belgium's **GDP** between the years **2006 and 2026**. The graph will display bars, each representing the GDP for a specific year, allowing you to visually compare how Belgium's economy changes over time.

Steps to Create a Bar Graph in Power BI

1. Insert a Bar Chart Visualization

- Open **Power BI Desktop** and go to the **Visualizations Pane** on the right side of the screen.
- Click on the **Bar Chart** icon. You have several options (e.g., **Clustered Bar**, **Stacked Bar**), but for comparing GDP over time, **Clustered Bar Chart** is usually the most effective choice.
- **Clustered Bar Chart** will place each year's GDP side by side, making it easy to compare the values.

Once you click on the **Bar Chart** icon, Power BI will add a blank bar chart to your **report canvas**.

2. Filter the Dataset to Display Only Data for Belgium

- Now, you need to focus on data related to **Belgium**.
- From the **Fields Pane** on the right, locate the **Country Name** field from your dataset.
- Drag **Country Name** and drop it into the **Filters** pane (on the right side).
- In the filter pane, choose **Belgium** so that the dataset is filtered to show only Belgium's data.

This will ensure that the bar graph displays GDP data for **Belgium** only, from 2006 to 2026, rather than data for all countries.

3. Drag 'Year' to the X-Axis

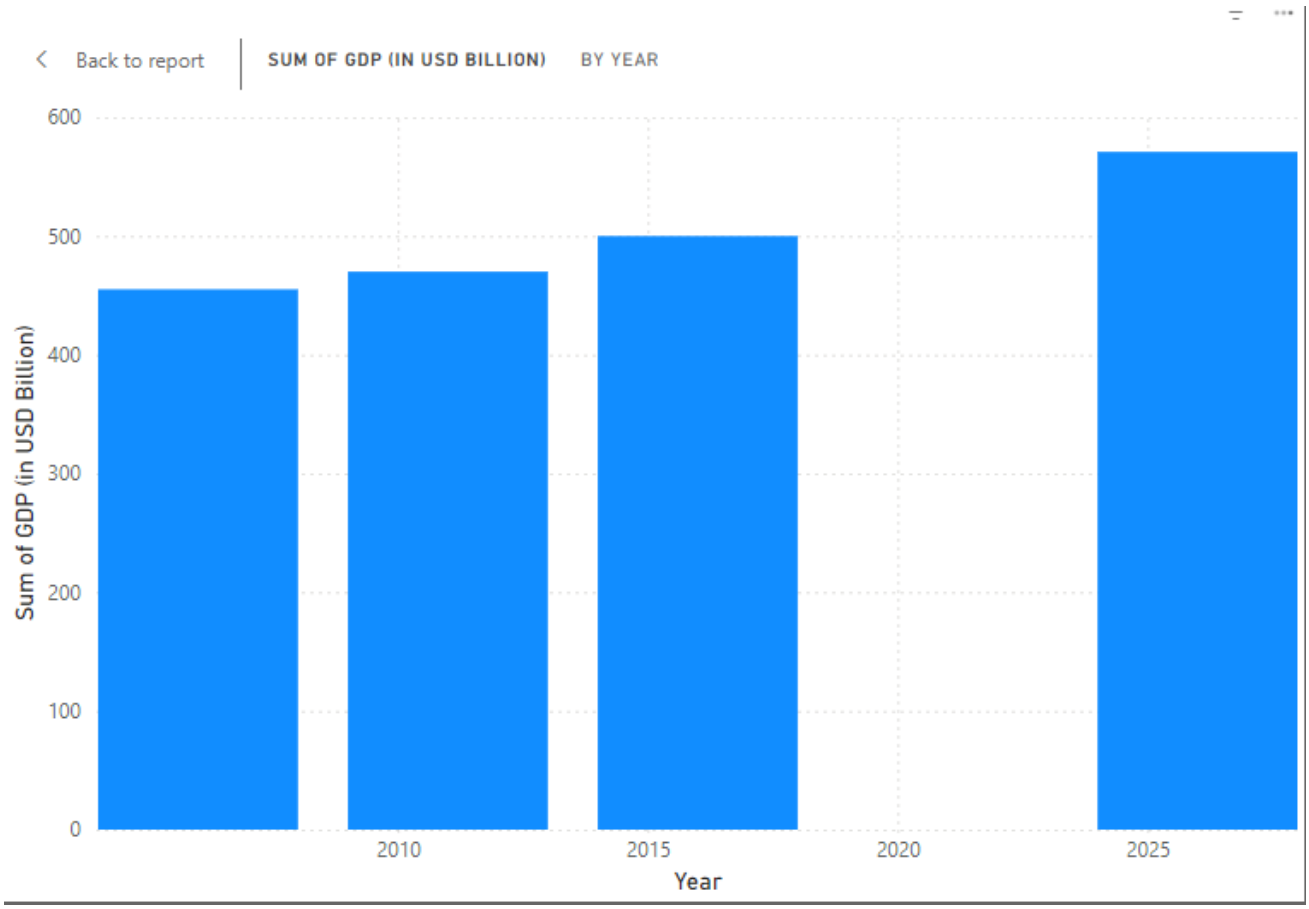
- In the **Fields Pane**, locate the **Year** field.
- Drag **Year** and drop it into the X-**Axis** section of the bar chart visualization (in the Visualizations pane).

    - The **X-axis** (horizontal axis) will now represent the **years** (2006 to 2026).
    - Each bar will correspond to a different year.

4. Drag 'GDP (in USD)' to the Y-Axis

- Next, locate the **GDP (in USD)** field in the Fields Pane.
- Drag **GDP (in USD)** and drop it into the **Values** section of the bar chart visualization.

    - The **Y-axis** (vertical axis) will now represent the **GDP** values in billions of USD.
    - Each bar's height will correspond to the GDP value for that specific year.



iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singapore by the year 2010.

Pie Chart to Visualize GDP of Selected Countries in 2010

A **Pie Chart** is a circular statistical chart divided into slices, where each slice represents a proportion of the whole. In this case, we will create a pie chart in **Power BI** to visualize the GDP contributions of **India, Nepal, Romania, South Asia, and Singapore** for the year **2010**.

Steps to Create the Pie Chart in Power BI

1. Insert a Pie Chart Visualization

- In the **Visualizations Pane** on the right side, locate the **Pie Chart** icon (a circular chart symbol).

- Click on the **Pie Chart** icon to insert a blank pie chart into your **report canvas**.

2. Filter the Dataset to Show Data for 2010

To ensure the chart only includes GDP data for the year 2010 and the selected countries:

1. Locate the **Year** field in the **Fields Pane**.
2. Drag the **Year** field to the **Filters Pane** on the right side.
3. In the filter options, select **2010** to restrict the data to this year only.

Next, filter the dataset to include only the countries of interest (India, Nepal, Romania, South Asia, and Singapore):

1. Drag the **Country Name** field to the **Filters Pane**.
2. In the filter options, check the boxes for **India**, **Nepal**, **Romania**, **South Asia**, and **Singapore**.

    - This will ensure that the pie chart only displays data for these specific countries and regions.

3. Set 'Country Name' as the Legend

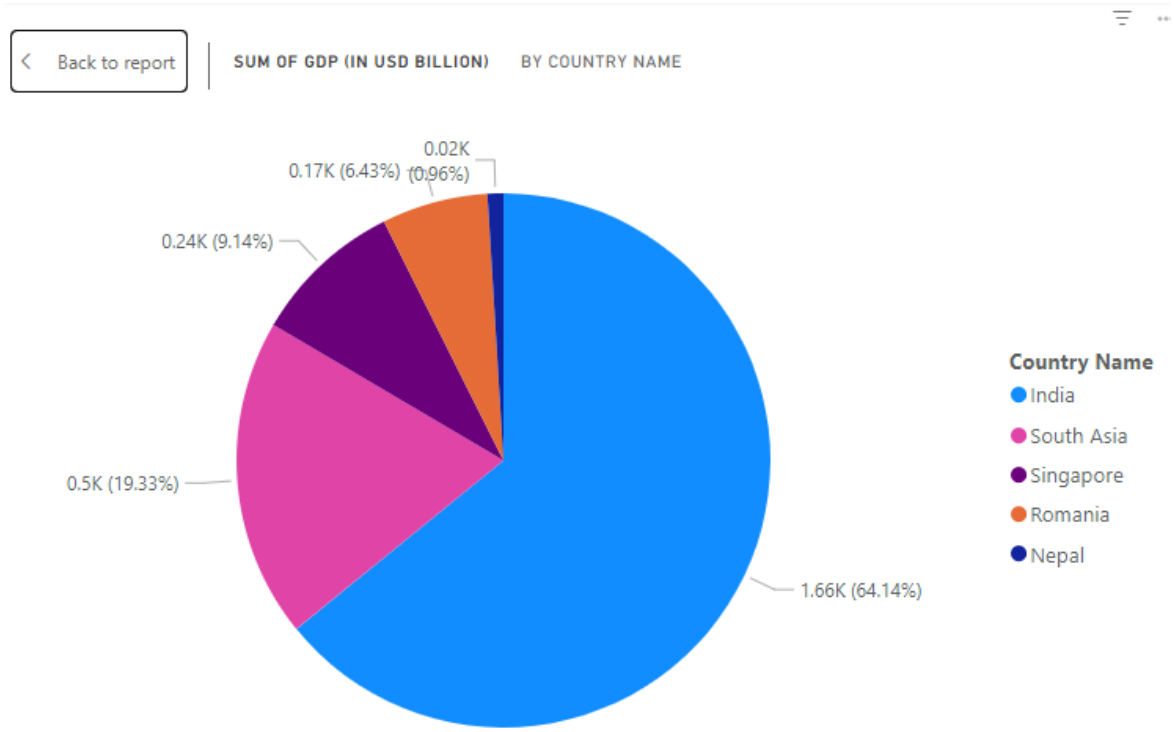
- In the **Fields Pane**, locate the **Country Name** field.
- Drag **Country Name** and drop it into the **Legend** section in the **Visualizations Pane**.

    - The **Legend** is used to differentiate the slices of the pie chart. Each slice will represent a specific country or region, with its name displayed in the legend on the chart.

4. Set 'GDP (in USD)' as the Values

- Locate the **GDP (in USD)** field in the **Fields Pane**.
- Drag **GDP (in USD)** and drop it into the **Values** section in the **Visualizations Pane**.

    - The **Values** determine the size of each slice in the pie chart. The GDP values for each country/region will dictate the proportion of the pie chart that each slice occupies.



iv) Visualize the countries Bhutan & Costa Rica competing in terms of GDP.

Visualization of Bhutan & Costa Rica Competing in Terms of GDP

To visually compare the GDP trends of Bhutan and Costa Rica over the years, a **Line Chart** is an ideal choice. Line charts effectively illustrate changes over time, allowing us to observe and compare patterns for both countries in a single graph.

Steps to Create the Line Chart in Power BI

1. Insert a Line Chart Visualization

1. In the **Visualizations Pane** on the right, locate the **Line Chart** icon (a chart with a line graph symbol).
2. Click on the **Line Chart** icon to add a blank line chart to your report canvas.

2. Filter the Dataset to Include Only Bhutan and Costa Rica

To ensure the chart only shows data for **Bhutan** and **Costa Rica**:

1. Locate the **Country Name** field in the **Fields Pane**.
2. Drag the **Country Name** field into the **Filters Pane**.
3. In the filter options, select only **Bhutan** and **Costa Rica**.

    - This step excludes data for other countries in the dataset.

3. Add 'Year' to the X-Axis

1. Locate the **Year** field in the **Fields Pane**.
2. Drag the **Year** field into the **X-Axis** section of the **Visualizations Pane**.

    - The X-axis will now display the timeline for the GDP data.

4. Add 'GDP (in USD)' to the Y-Axis

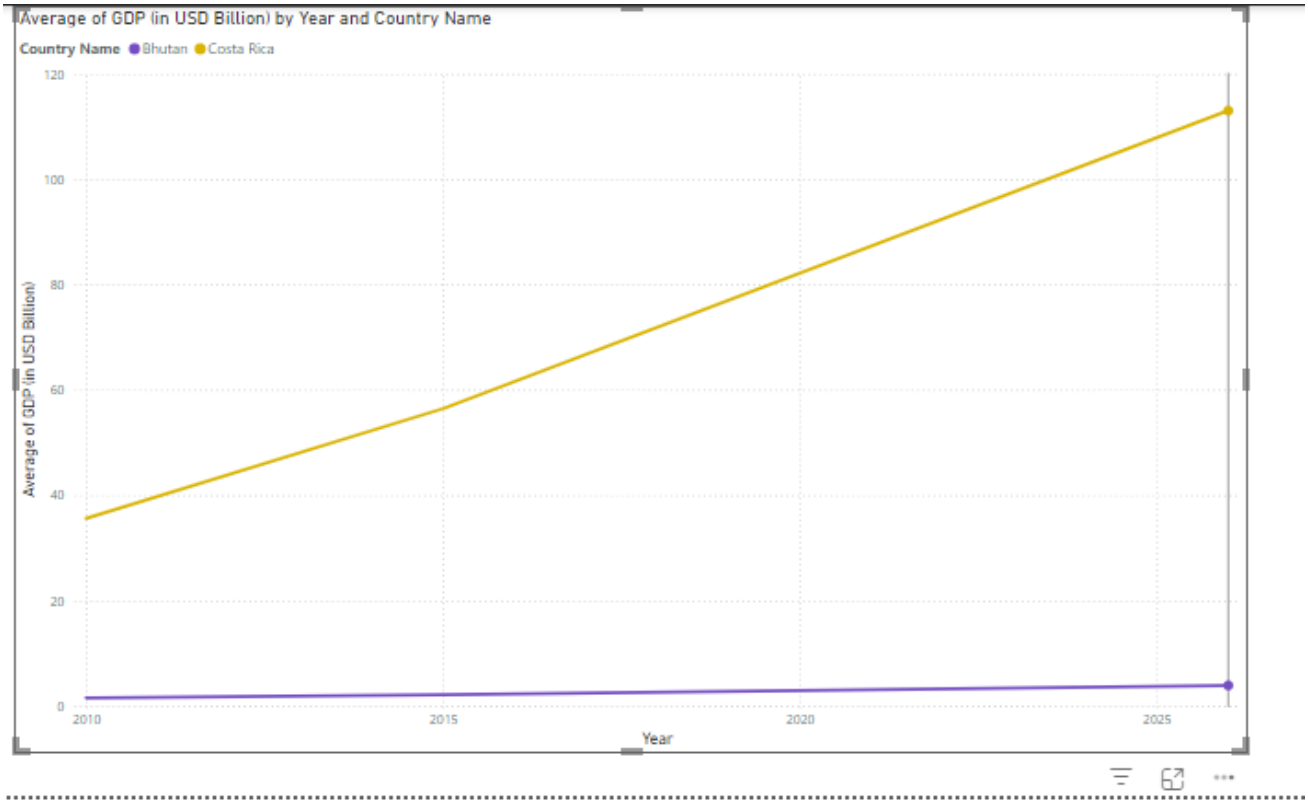
1. Locate the **GDP (in USD)** field in the **Fields Pane**.
2. Drag the **GDP (in USD)** field into the **Y-Axis** section of the **Visualizations Pane**.

    - The Y-axis will display the GDP values, enabling a comparison of GDP magnitudes over time.

5. Add the Country Name to the Legend

Drag the **Country Name** field into the **Legend** section of the Visualizations Pane.

- This will create separate lines for Bhutan and Costa Rica based on their respective GDP data.
- Now, each country will have its own line on the chart.



v) Create a scatter plot or circle views of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006.

Scatter Plot for GDP of Mexico, Algeria, Fiji, and Estonia (2004-2006)

What is a Scatter Plot?

A scatter plot is a visualization that uses Cartesian coordinates to display values for two variables for a set of data. In this context:

- **X-Axis**: Year (2004–2006)
- **Y-Axis**: GDP (in USD Billion)
- **Circle Size**: A third variable representing GDP magnitude can also be incorporated to enhance the visual impact.

Steps to Create the Scatter Plot in Power BI

*2. **Insert a Scatter Plot Visualization***

1. In the **Visualizations Pane** on the right, click on the **Scatter Chart** icon (a symbol with circular markers).
2. Drag the blank scatter chart to your canvas.

3. ***Filter the Dataset for Relevant Data***

1. Locate the **Country Name** field in the Fields Pane.
2. Drag the **Country Name** field into the **Filters Pane**.
3. In the filter options:
    - Select only **Mexico**, **Algeria**, **Fiji**, and **Estonia**.
4. Drag the **Year** field into the **Filters Pane**.
5. Filter the data to include only **2004 to 2006**.

4. Assign Data to Axes

1. **X-Axis**:
    - Drag the **Year** field into the **X-Axis** section in the Visualizations Pane.
    - The X-axis will represent the timeline.
2. **Y-Axis**:
    - Drag the **GDP (in USD Billion)** field into the **Y-Axis** section.
    - The Y-axis will display the GDP values for each country.

5. Add Data for Circle Size

1. Drag the **GDP (in USD Billion)** field into the **Size** section in the Visualizations Pane.
2. This will scale the circle size proportionally to the GDP value, making larger GDPs more visually prominent.

6. Add Country Name to the Legend

1. Drag the **Country Name** field into the **Legend** section.
    - This step will assign a unique color to each country, allowing differentiation between Mexico, Algeria, Fiji, and Estonia.

Note: If the scatter plot circles for **2004** and **2006** are displayed partially,

- Open the **Format Pane** by selecting the scatter plot visualization.
- Expand the **X-Axis** settings.
- Check the following:

Type: Ensure it is set to **Categorical** instead of **Continuous**.

7. Customize the Scatter Plot

1. **Title**: Add a descriptive title, such as **"GDP Comparison (2004–2006): Mexico, Algeria, Fiji, and Estonia"**.
2. **Axis Titles**:
    - Label the X-axis as **Year**.
    - Label the Y-axis as **GDP (in USD Billion)**.
3. **Markers**:
    - Increase marker size for better visibility.
    - Enable tooltips to display details (e.g., country name, year, GDP) when hovering over circles.