

Unearthing The Environmental Impact of Human Activity: A Global CO₂ Emission Analysis



Category: Data Analytics

Skills Required:

Exploratory Data Analysis, MySQL, Databases, Tableau

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Team members: 1) M Durga Narasimha Naidu

2) M Lokesh

3) Rakesh

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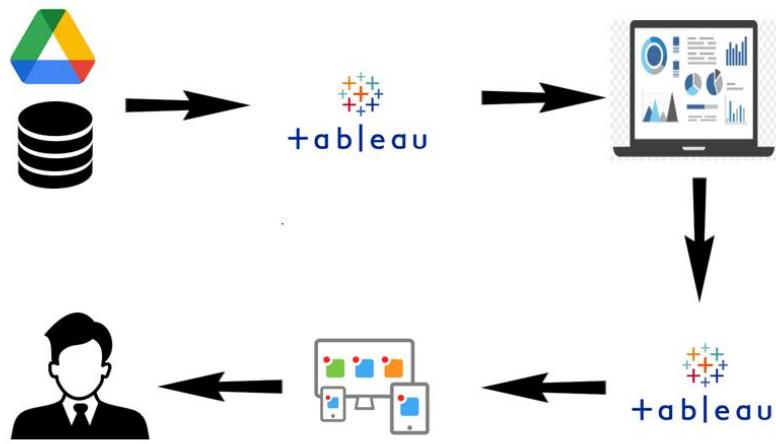
Project Description:

Global warming is one of the biggest challenges currently being faced by humanity, although the correlation is not causation a likely cause of global warming is increased atmospheric carbon dioxide from human activities. CO₂ Emission refers to the Carbon Dioxide emitted throughout the world. For this analysis, we will be focusing on CO₂ Emissions and their effect on the world we live in as well as some key factors and stats that may play a role in the emission of CO₂ globally. Fossil fuel use is the primary source of CO₂. The data throws light onto how much fossil fuels are burnt, per year per nation, which amounts to an increase in CO₂ every year. This will help researchers and environmental experts to predict global warming. So that countries should set a goal to decrease this amount yearly.

Analyzing Global Co₂ Emission across countries from 1975 to 2020. This dataset contains a record of Co₂ Emission by each Country and Region of Earth, here we are going to analyze and visualize Country-wise, Region wise and Overall Co₂ Emission on Earth.



Technical Architecture:



Pre-Requisites :

For Completing this project these are some of the prerequisites needed

- A system with a minimum 4GB RAM and 128GB Hard Disk
- Good Internet Connection
- Google Drive / Any of the Database Server with Management Studio
- MySQL:
- **SQL Server Management Studio:**
- **Tableau Desktop:**
- Tableau Public Account: <https://public.tableau.com/app/discover>
- Html, CSS or Bootstrap

Prior-Knowledge

To Complete this project, one must understand the below concepts and able to work with the tools

- **Data Visualization:** Data visualization is the graphical representation of data to provide insights and aid understanding. It involves presenting data in visual formats such as charts, graphs, and maps to facilitate comprehension and interpretation. Effective data visualization can reveal patterns, trends, and relationships in data that might not be apparent from raw numbers alone, making it a valuable tool for decision-making and communication.
- **Univariate, Bi-Variate, and Multi-Variate Analysis:** Data visualization techniques enable exploration of data from various perspectives, including univariate (single variable), bi-variate (two variables), and multi-variate (multiple variables) analysis.
- **Chart Types:** Data visualization offers a range of chart types such as bar charts, line charts, scatter plots, histograms, etc., each with its strengths for representing different types of data effectively.
- **Tableau and Business Intelligence:** Tableau is a popular data visualization tool used for creating interactive dashboards and reports. It's widely employed in business intelligence to analyze data, uncover insights, and drive informed decision-making.

Project Objectives:

By the end of this project, you will:

- Able to Connect Tableau with different data sources
- Know fundamental concepts and techniques used for Data Visualization.
- Gain a broad understanding about data and different types of charts.
- Have knowledge of developing Visualizations, Dashboards and Story.
- Able to Integrate the developed dashboard and story with the web application

Project Flow :

To accomplish this, we must complete all the activities listed below,

- Data collection
 - Collect the dataset or create the dataset
- Database /Spreadsheet Connection
 - Understand the dataset
 - Import Dataset into the database
 - Connect Tableau Desktop to Database server.
- Visualizing and analyzing data
- Understand the Data and the Business Questions
- Based on the Business questions develop the different visualizations
- Dashboard
 - Develop the Dashboard
- Story
 - Develop the Storyboard

- Publishing to the Tableau Public & Web Application Integration
 - Developed Visualizations, Dashboard and story will be published to Tableau Public Account.
 - Once it is published, we will get the shareable links
 - Develop a web application using HTML, CSS or Using Bootstrap
 - Integrate the Visualizations, Dashboard and Story with the Web Application

Data Collection:

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes and generate insights from the data.

LINK:

https://drive.google.com/file/d/1n764uDPT_ZF7kzGFLtpxkwBBsDBScbWm/view

Working With Dataset :

Understand The Data

The dataset consists of CO2 emissions in metric tons per capita of every country around the world. The data is collected from 1975 to 2020. In this dataset Countries and regions are included. Data is initially pre-processed using excel. The dataset contains Country-

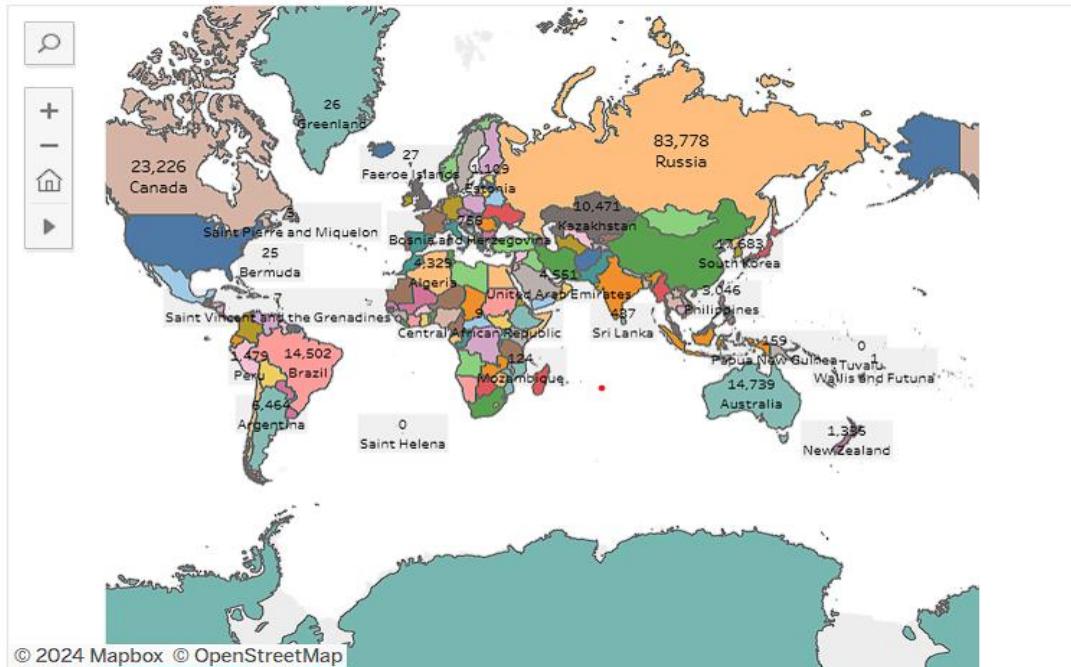
- Country for which Co2 is Recorded
- Year- Year the data was recorded
- Co2 Emission (In Million Metric Tons)
- Co2 Growth per Capita
- Co2 Per Capita
- Cumulative Co2
- Several Fossil Fuels rate of Emission

Data Visualization

Data visualization is the process of creating graphical representations of data to help people understand and explore information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

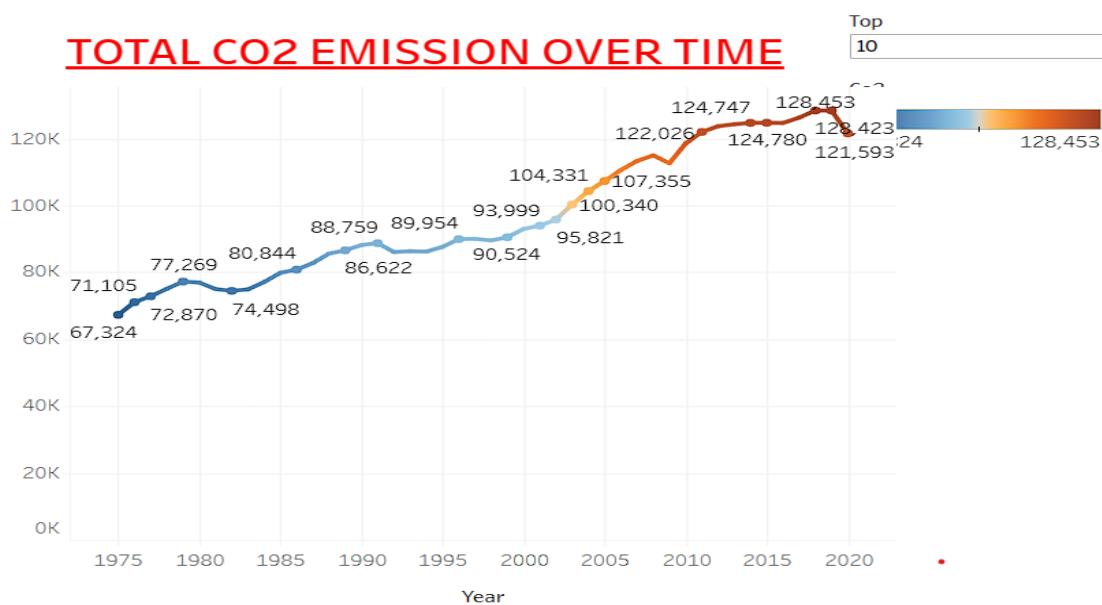
Total World Emission,

WORLD CO₂ EMISSION



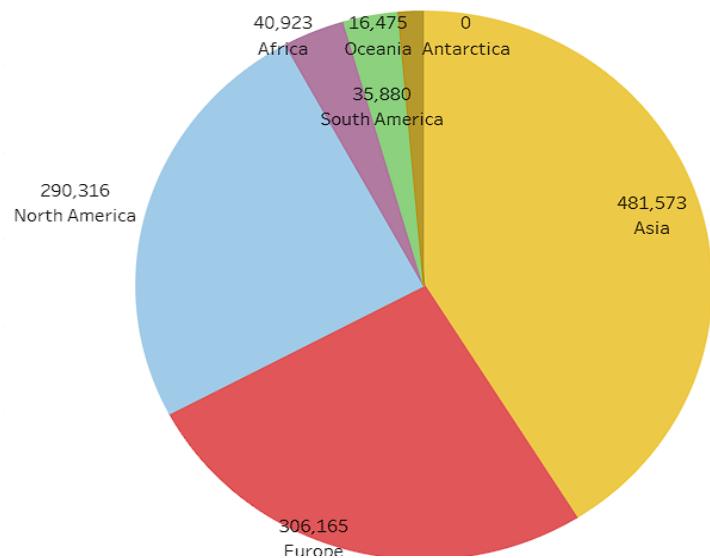
This the visualization of total co2 emission by all the countries or total world co2 emission

Co2 Emission Over Time



⌚ Total Emission by Continents

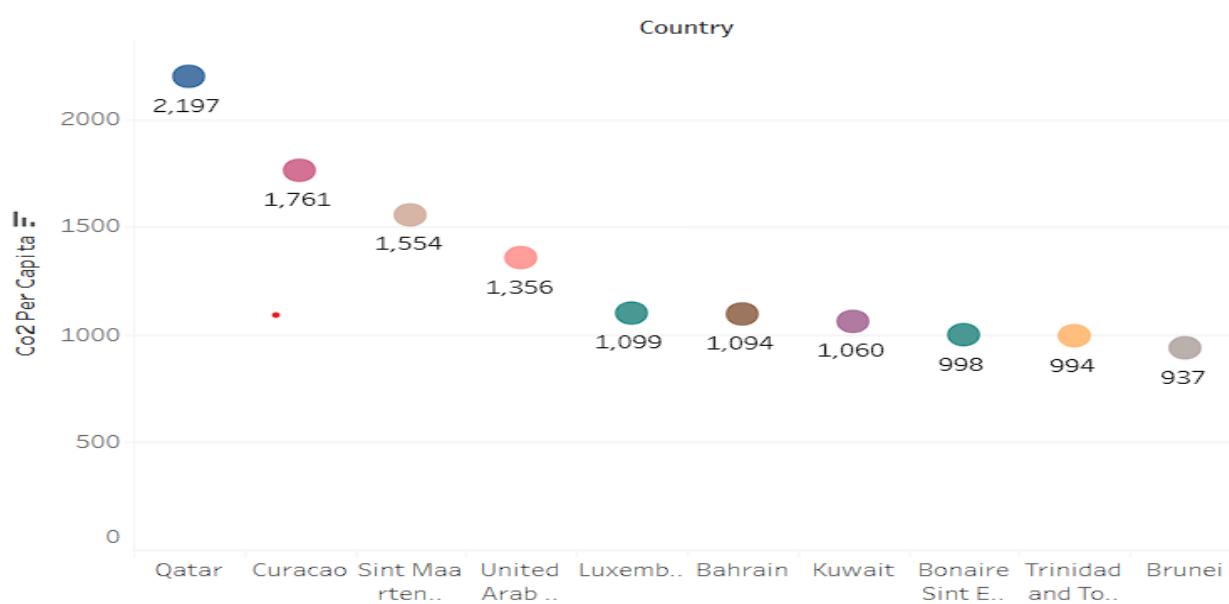
TOTAL CO2 EMISSION BY CONTINENTS



This is the visualization of total CO₂ emission by all the continents: North America, South America, Europe, Asia, Africa, oceania

⌚ Co2 Emission Per Capita

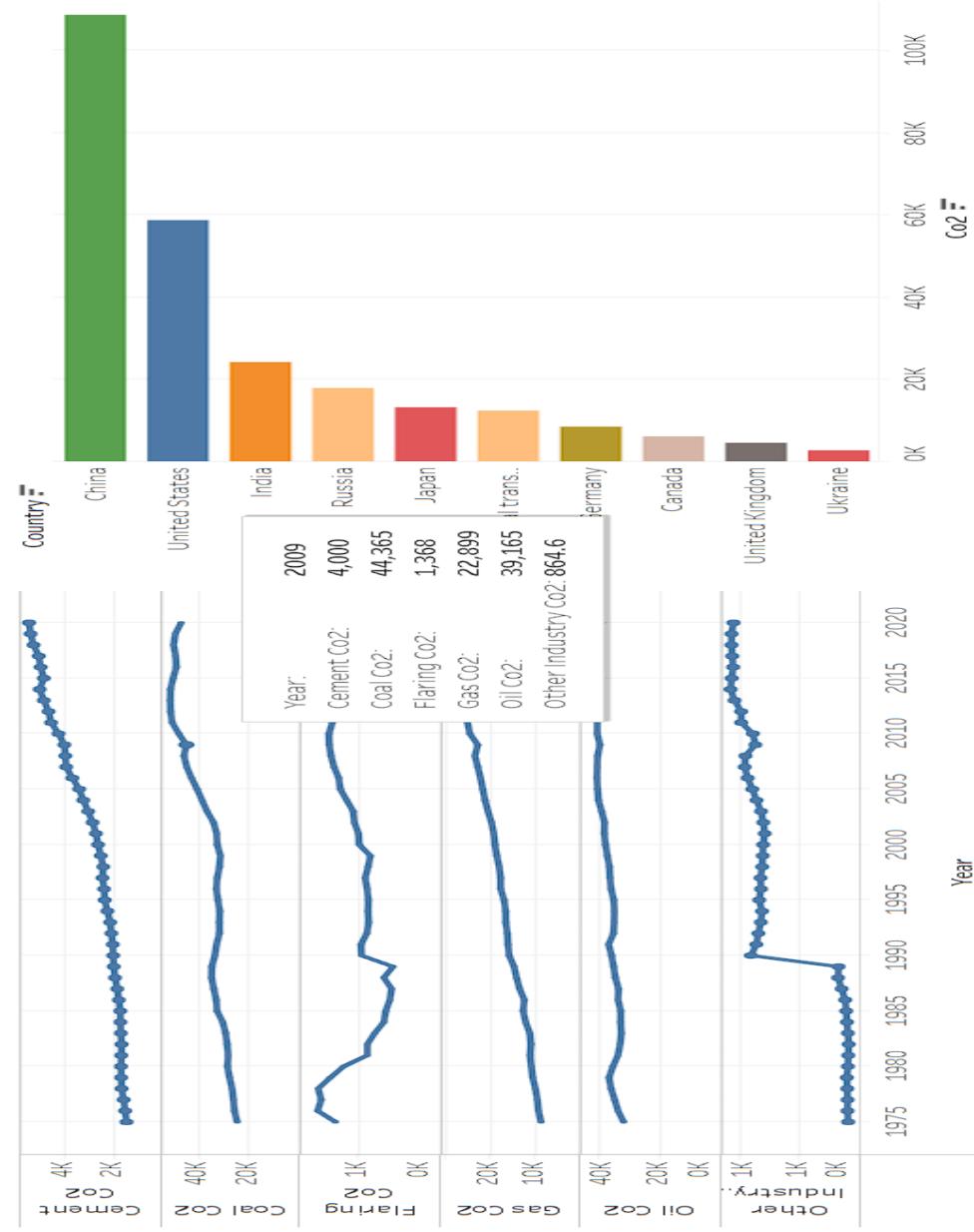
CO2 EMISSION PER CAPITA



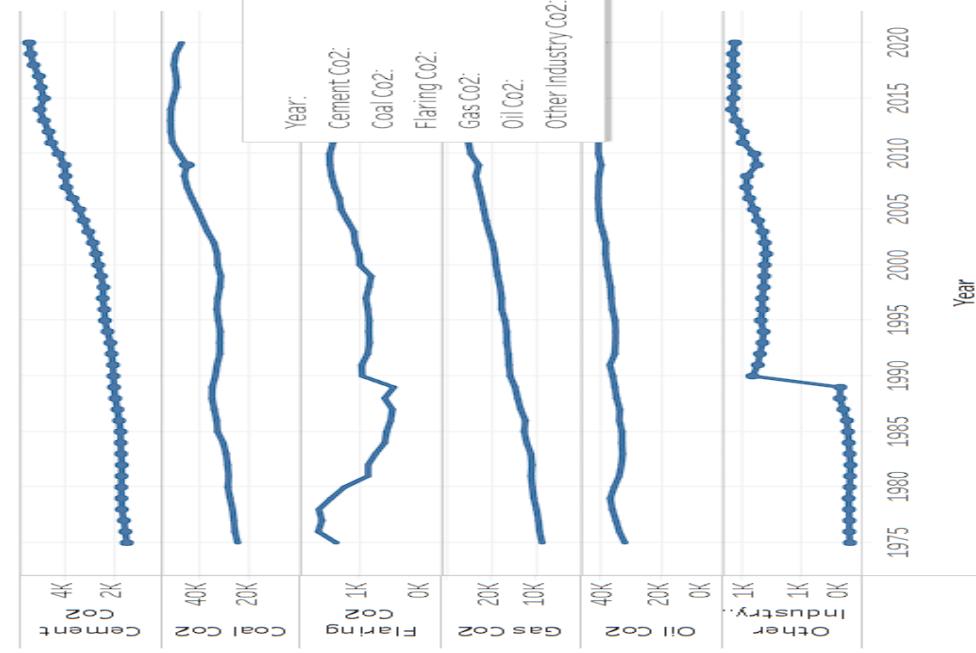
⌚ Co2 Emission Per Capita, Co2 Emission by International Factors,

Emission Rate Over Years

CO2 EMISSION OVER PAST 10 YEARS

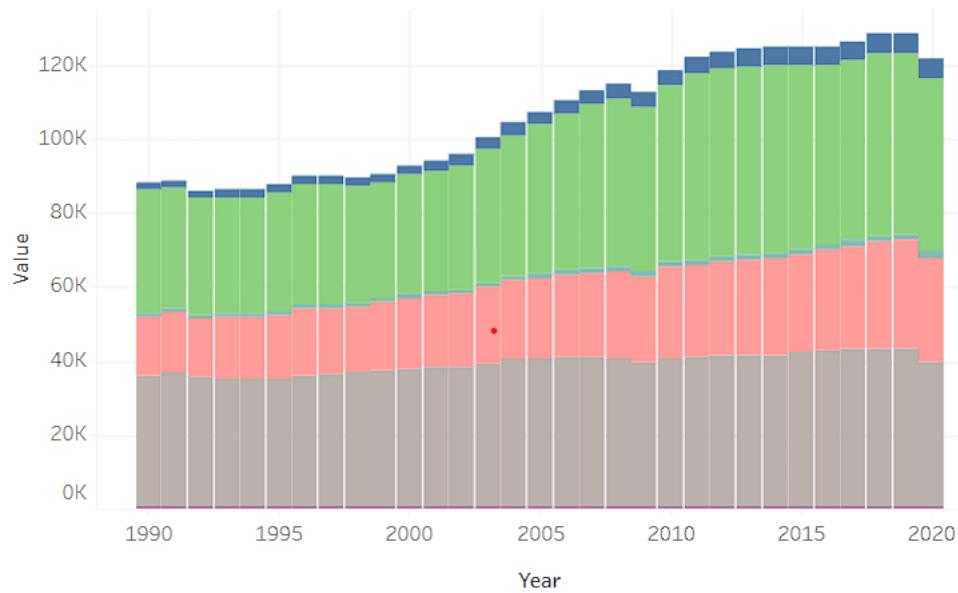


EMISSION RATE BY INTERNAL FACTORS

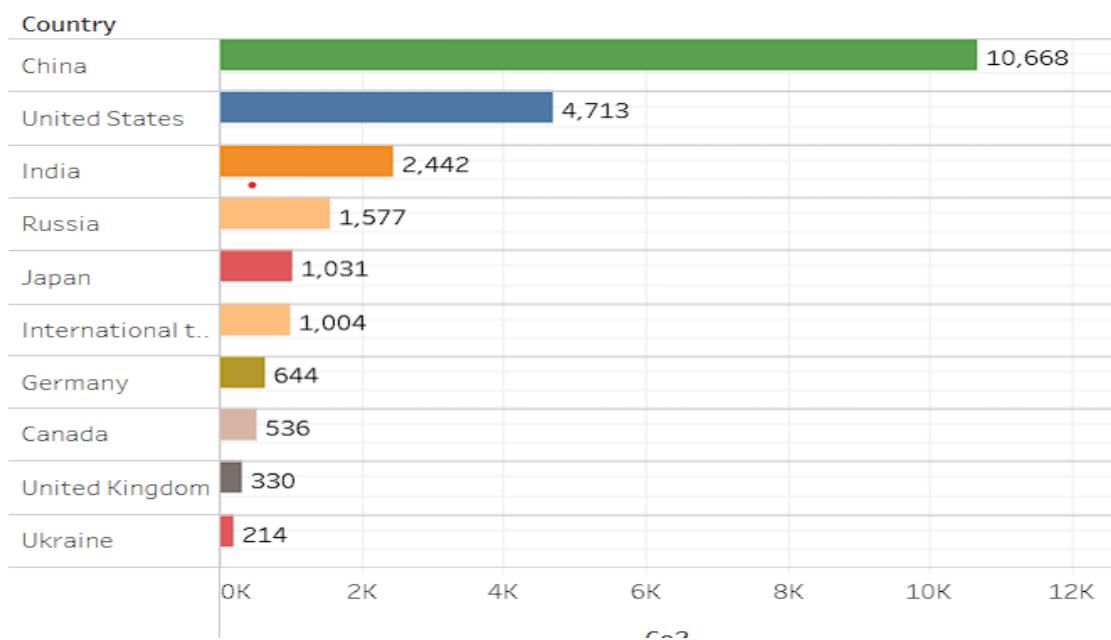


⌚ Co2 Contribution by Different Fossil Fuels, Co2 Emission Over Past

10 Years, Change in Co2 Emission and Co2 Emission In 2020

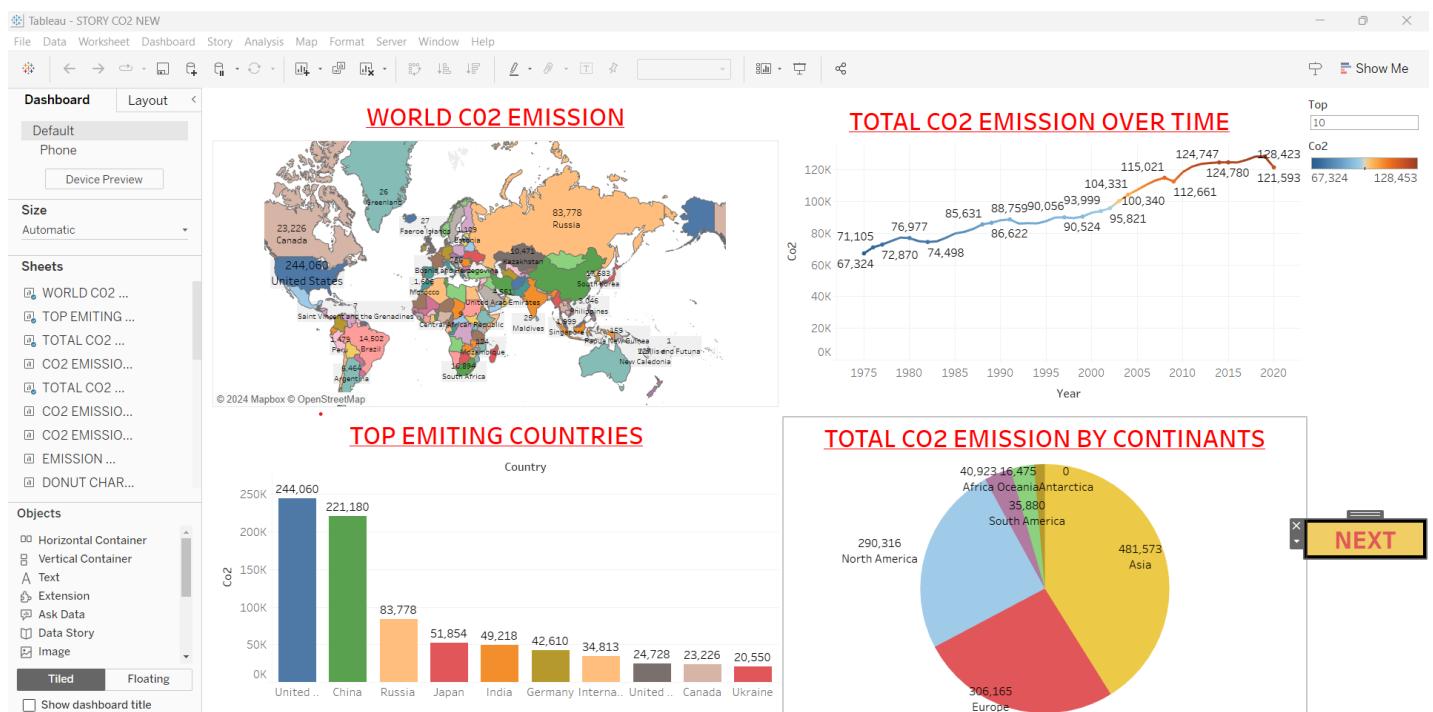


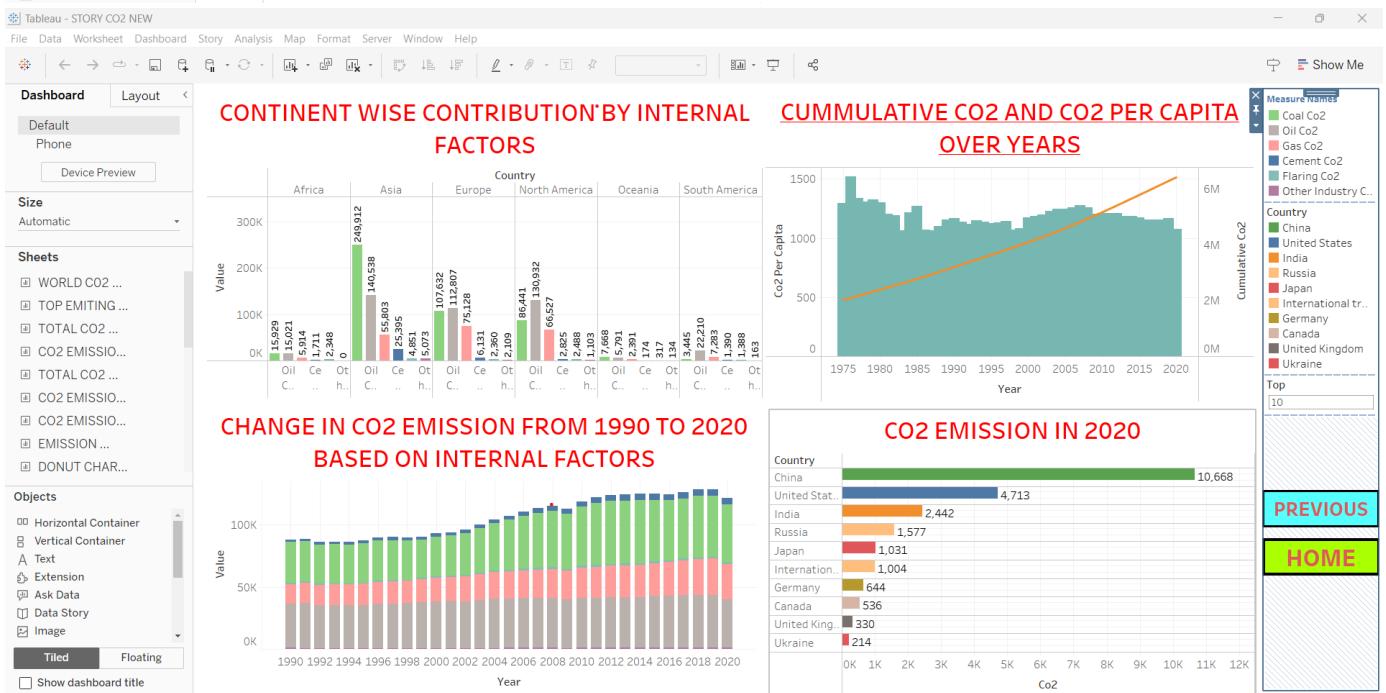
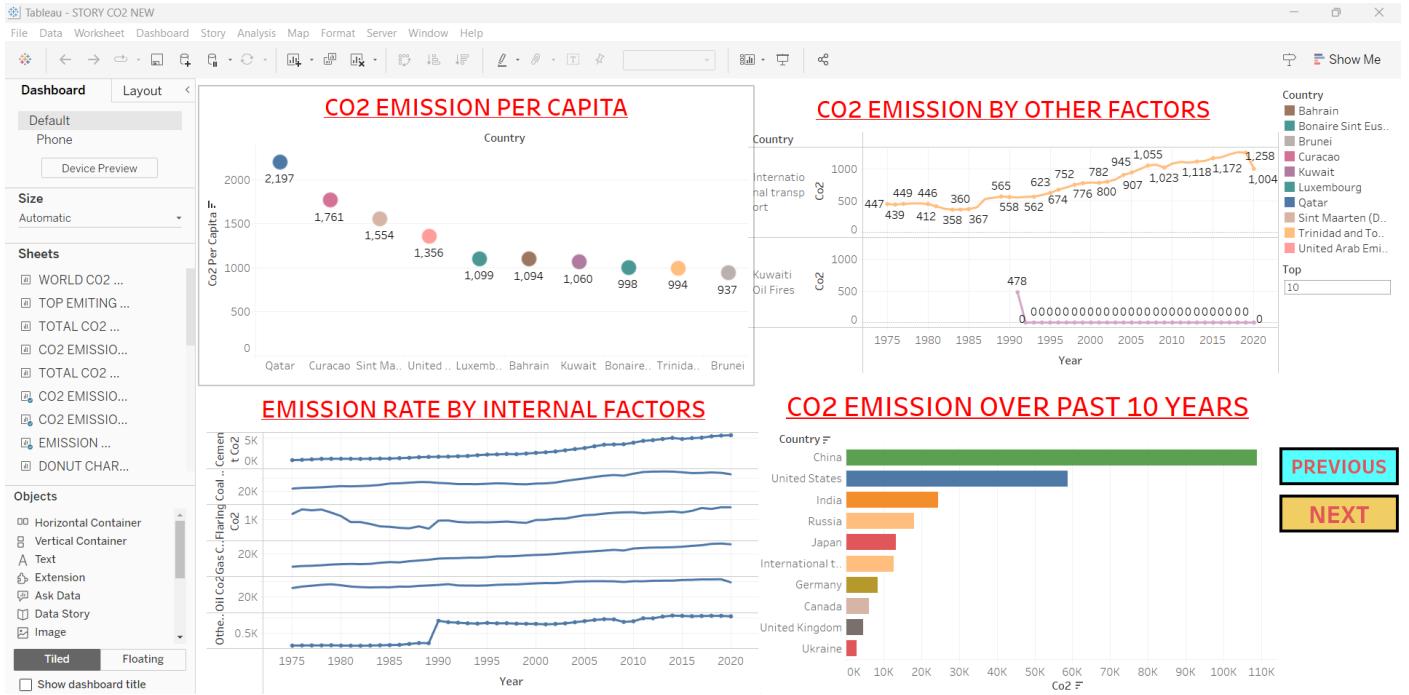
CO2 EMISSION IN 2020



Dashboard:

A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.



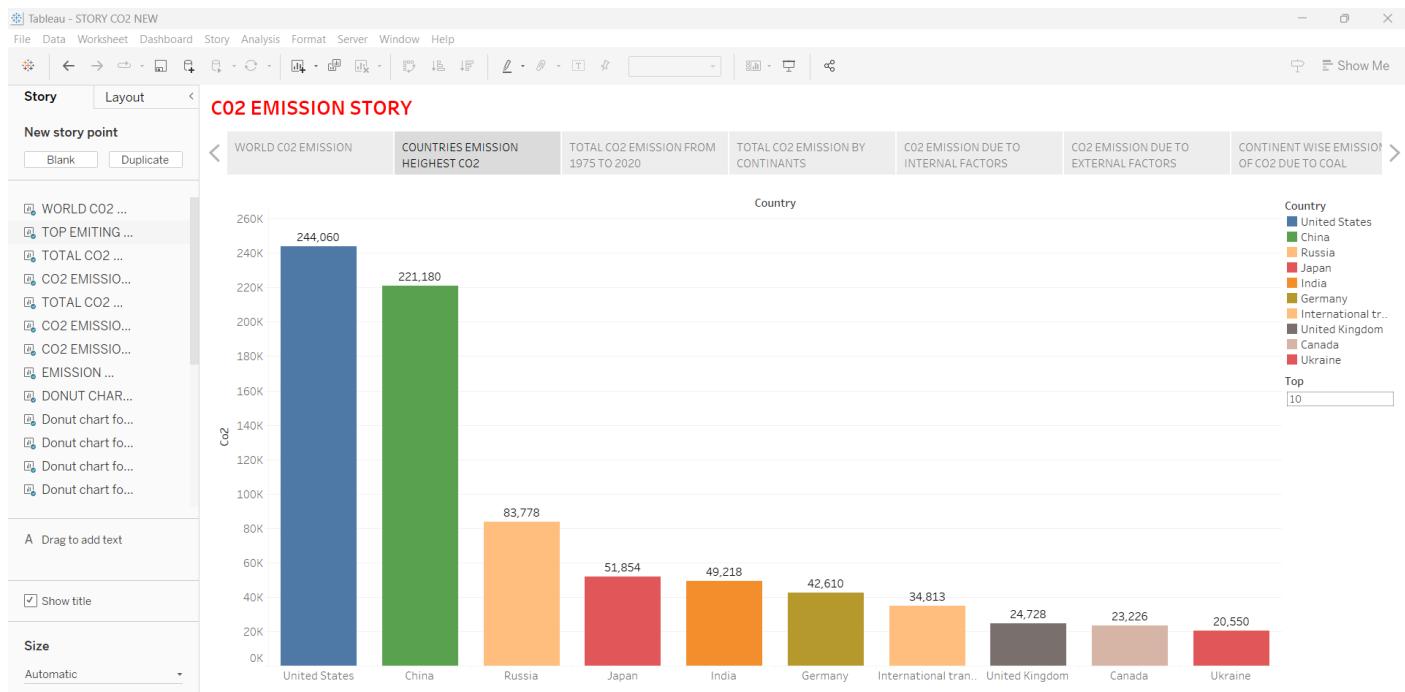


Story:

A data story is a way of presenting data and analysis in a narrative format, with the goal of making the information more engaging and easier to understand. A data story typically includes a clear introduction that sets the stage and explains the context for the data, a body that presents the data and analysis in a logical and systematic way, and a conclusion that summarizes the key findings and highlights their implications. Data stories can be told using a variety of mediums, such as reports, presentations, interactive visualizations, and videos.

Link :

https://public.tableau.com/views/CO2emitionanalysisSTORY/C02EMITIONSTORY?:language=en-US&publish=yes&:sid=&:display_count=n&:origin=viz_share_link

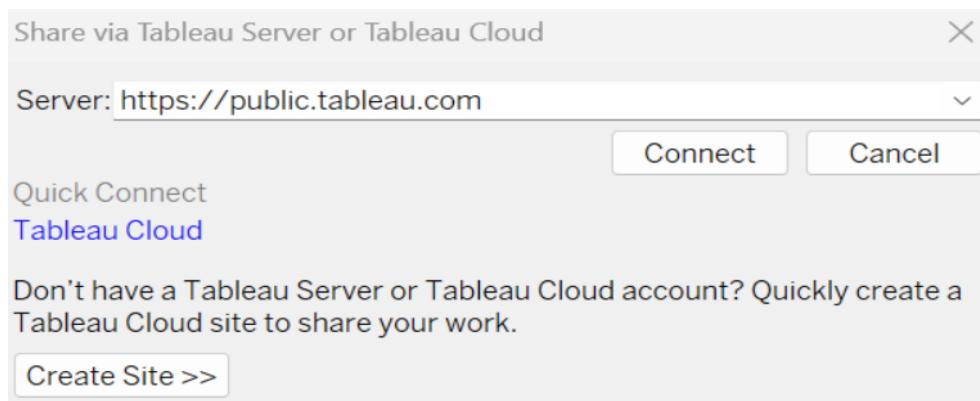


Publishing And Web Integration:

Publishing helps us to track and monitor key performance metrics, to communicate results and progress. help a publisher stay informed, make better decisions, and communicate their performance to others.

Publishing Dashboard and Reports To Tableau Public

Step 1: Go to Dashboard/story, click on the share button on the top ribbon



Step 2: Once you click on connect it will ask you for the tableau public username and password



Once you login into your tableau public using the credentials, the particular visualization will be published into the tableau public

Note: While publishing the visualization to the public, the respective sheet will get published when you click on the share option.

Integrating In Web with Embedded Code :

```
1  from flask import Flask, render_template
2
3  app = Flask(__name__)
4
5  @app.route('/')
6  @app.route('/index')
7  def index():
8      return render_template('index.html')
9
10 @app.route('/board')
11 def board():
12     return render_template('dashboard.html')
13 @app.route('/story')
14 def story():
15     return render_template('story.html')
16
17 if __name__=='__main__':
18     app.run(debug=True)
```

A Global CO2 Emission Analysis x +

127.0.0.1:8000

CO₂

Home about Dashboard Story Team

ABOUT

What to Know About CO2 Emissions

- A naturally occurring gas
- Humans started emitting CO₂ during the Industrial Revolution
- Human activity includes but not limited to transportation and electricity
- Today, 30 billion tons per year of CO₂ (or 84%) is related to human activity
- CO₂ drives climate crisis and also affects the oceans, making them 30% more acidic

A Global CO2 Emission Analysis x +

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CO₂

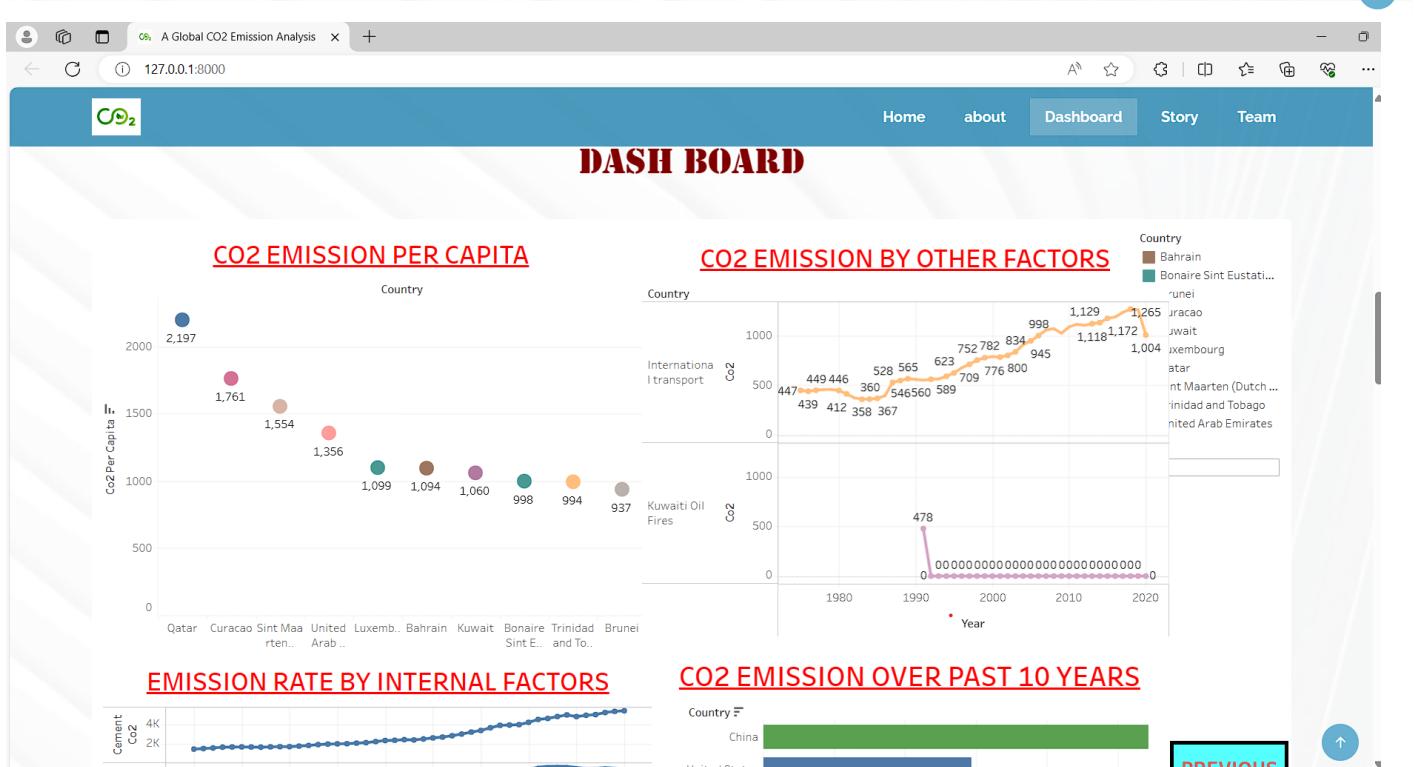
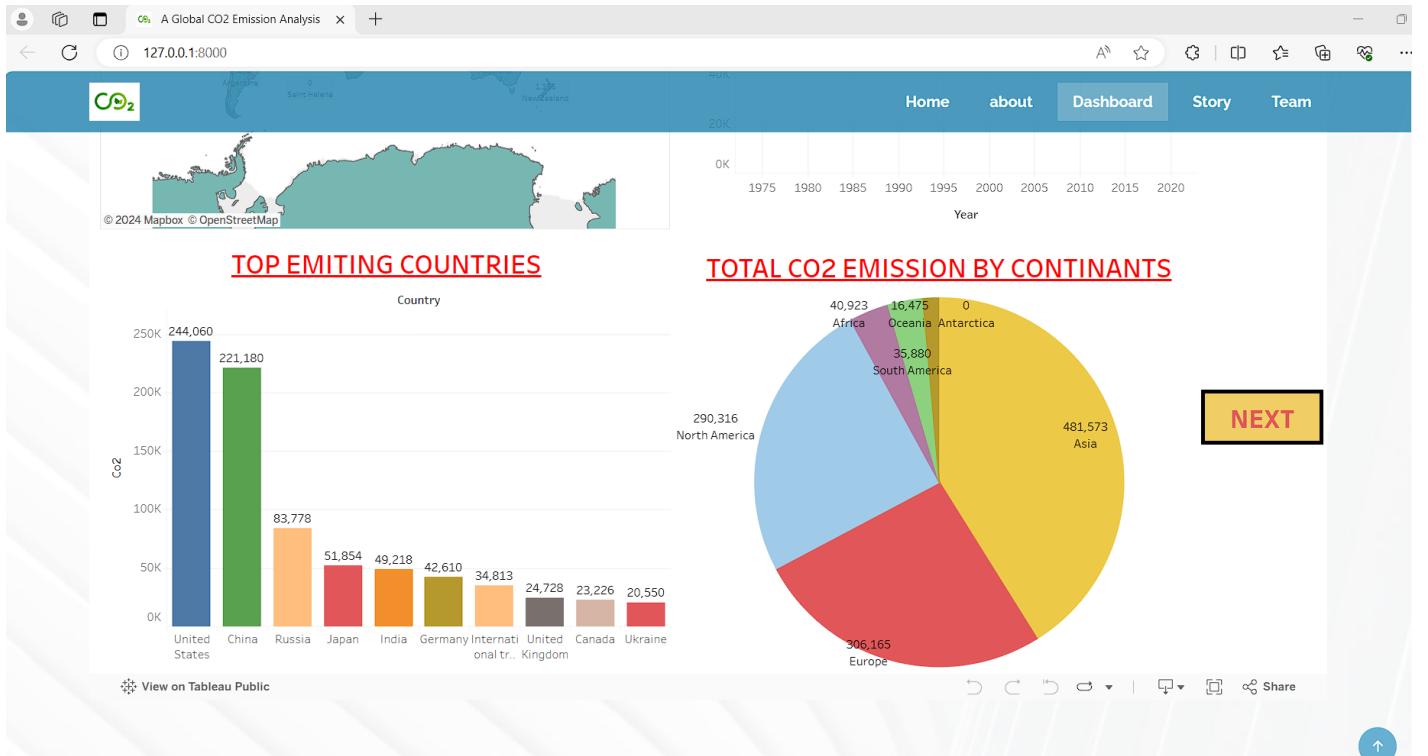
Home about **Dashboard** Story Team

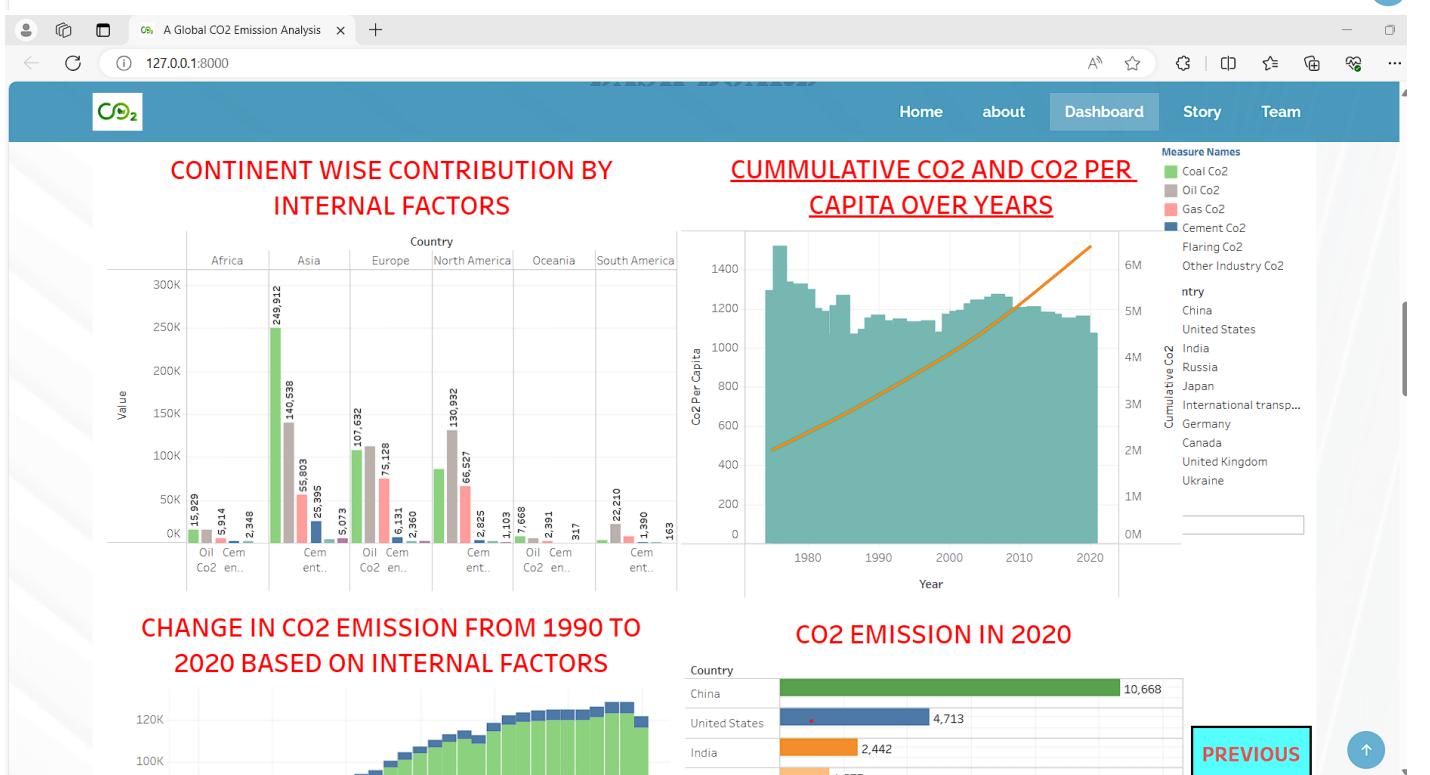
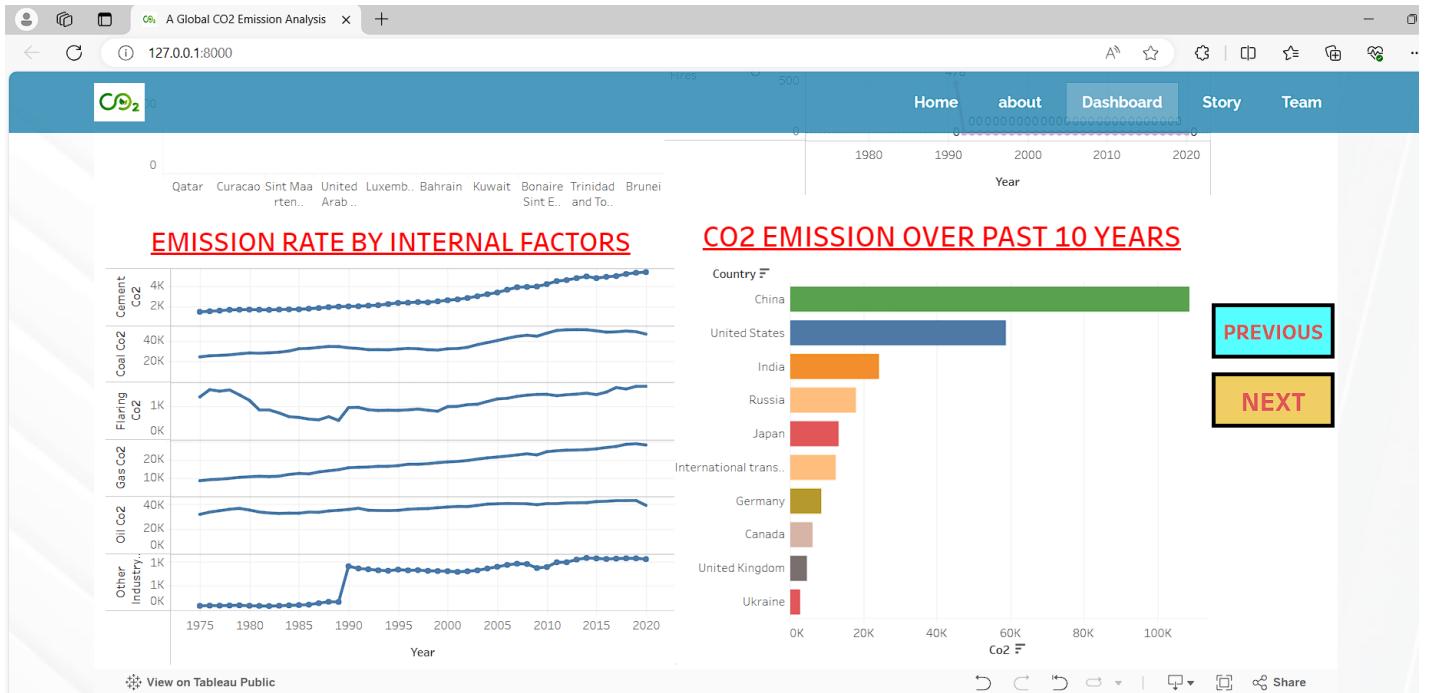
DASH BOARD

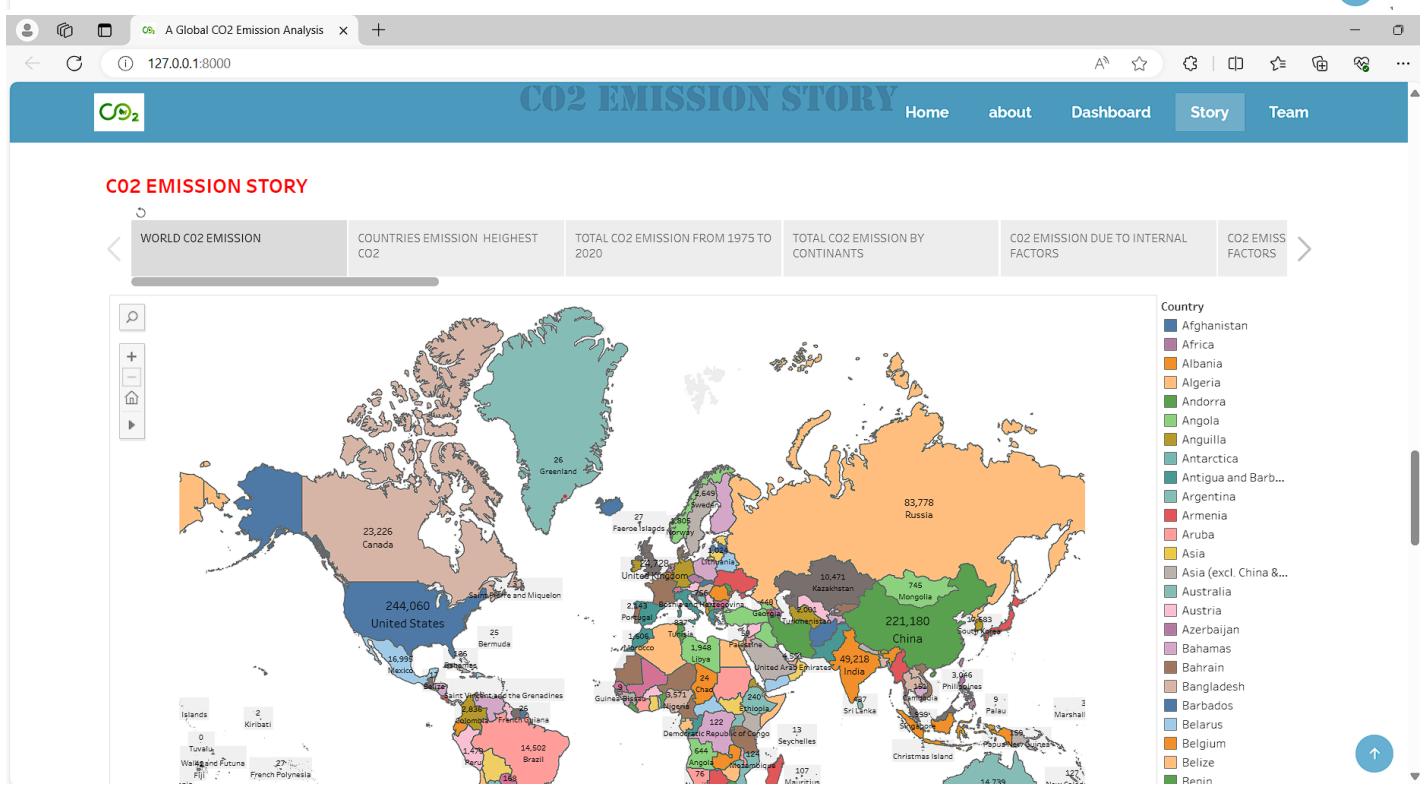
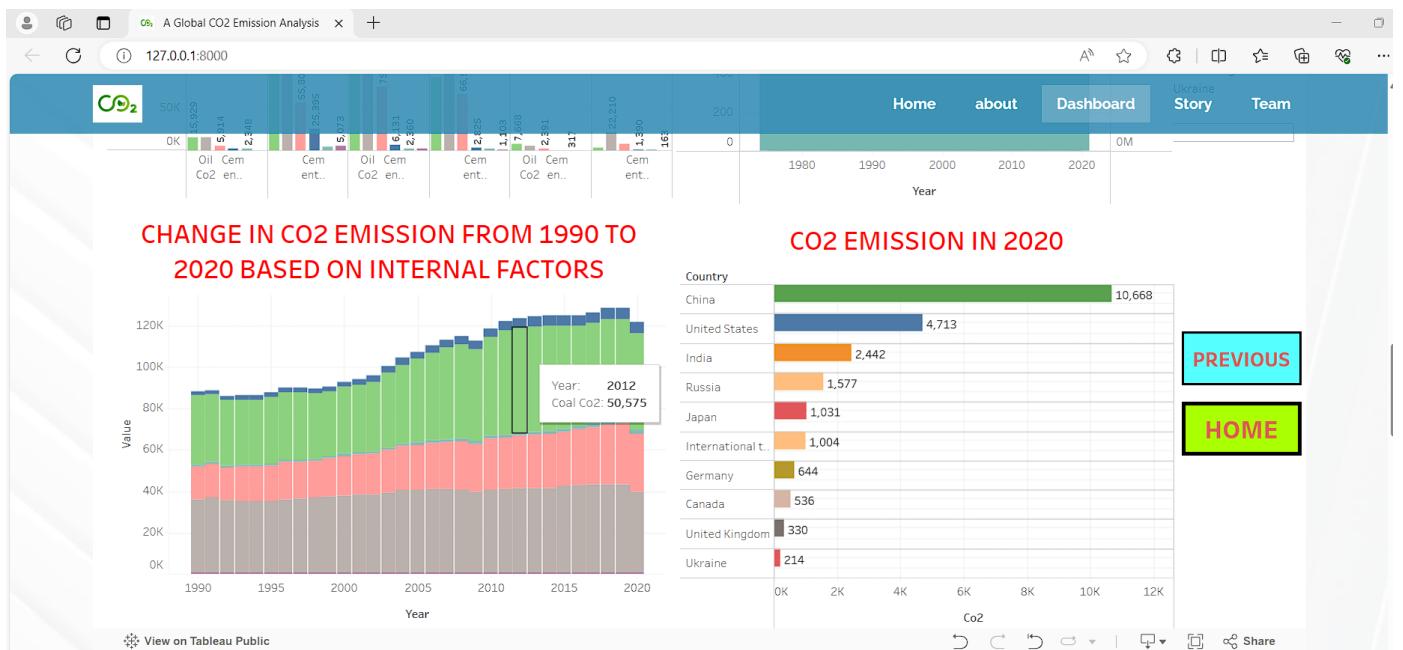
WORLD CO2 EMISSION

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Country	CO ₂ Emissions
China	128,453
United States	121,593
India	120,423
Russia	120,026
United Kingdom	119,621
Germany	118,453
Japan	117,355
Canada	116,726
France	115,498
South Korea	114,999
Italy	114,000
Australia	113,739
Spain	113,555
Poland	113,444
Belgium	113,000
Netherlands	112,870
Greece	112,726
Portugal	112,500
Switzerland	112,000
Malta	111,800
Denmark	111,500
Chile	111,000
Thailand	110,500
Ukraine	110,000
Algeria	109,500
Iran	109,000
Costa Rica	108,500
Argentina	108,000
Colombia	107,500
Peru	107,000
Bolivia	106,500
Ecuador	106,000
Venezuela	105,500
Honduras	105,000
Mexico	104,500
Panama	104,000
Guatemala	103,500
El Salvador	103,000
Costa Rica	102,500
Argentina	102,000
Uruguay	101,500
Bolivia	101,000
Paraguay	100,500
Chile	100,000
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Peru	7,500
Colombia	7,000
Costa Rica	6,500
Argentina	6,000
Uruguay	5,500
Bolivia	5,000
Paraguay	4,500
Chile	4,000
Peru	3,500
Colombia	3,000
Costa Rica	2,500
Argentina	2,000
Uruguay	1,500
Bolivia	1,000
Paraguay	500
Chile	0







Conclusion:

- China is the highest Co2 Emitting country among the other countries.
The
- The United States is the second highest Co2 Emitting country.
- Asia is the highest Co2 Emitting continent among the other continents.
- Coal is the highest factor of Co2 Emission.
- Co2 Emission in 1975 was 67324 (in metric tons).
- Co2 Emission in 2020 was found to be 121593 (in metric tons).