# Project Report: Unearthing the Environmental Impact of Human Activity

## 1.INTRODUCTION:

### *1.1 Project Overview*

The project "Unearthing the Environmental Impact of Human Activity: A Global CO2 Emission Analysis" aims to comprehensively examine the environmental consequences of human activity, with a particular focus on the worldwide emissions of carbon dioxide (CO2). Human actions, including industrial processes, energy production, transportation, and deforestation, have led to a substantial increase in CO2 emissions, which in turn contributes to climate change and various environmental issues. This project seeks to shed light on the extent of this problem and explore potential solutions.

### *1.2 Purpose:*

The primary purpose of this project is to analyse global CO2 emissions, identify key sources, and evaluate their impact on the environment. By doing so, we aim to raise awareness, provide data for informed decision-making, and propose strategies to mitigate the adverse effects of CO2 emissions on our planet.

## 2. LITERATURE SURVEY

### *2.1 Existing problem:*

1) The problem involves escalating CO2 emissions from human activities.
2) CO2 emissions are a leading cause of climate change, with wide-ranging environmental consequences.

### *2.2 References:*


1) “Climate Change 101" - A simple guide to understanding climate change.
2) "Emissions Report 2022" - A report on the latest CO2 emissions data.
3) "Global Warming Impacts" - An overview of how climate change affects the world.

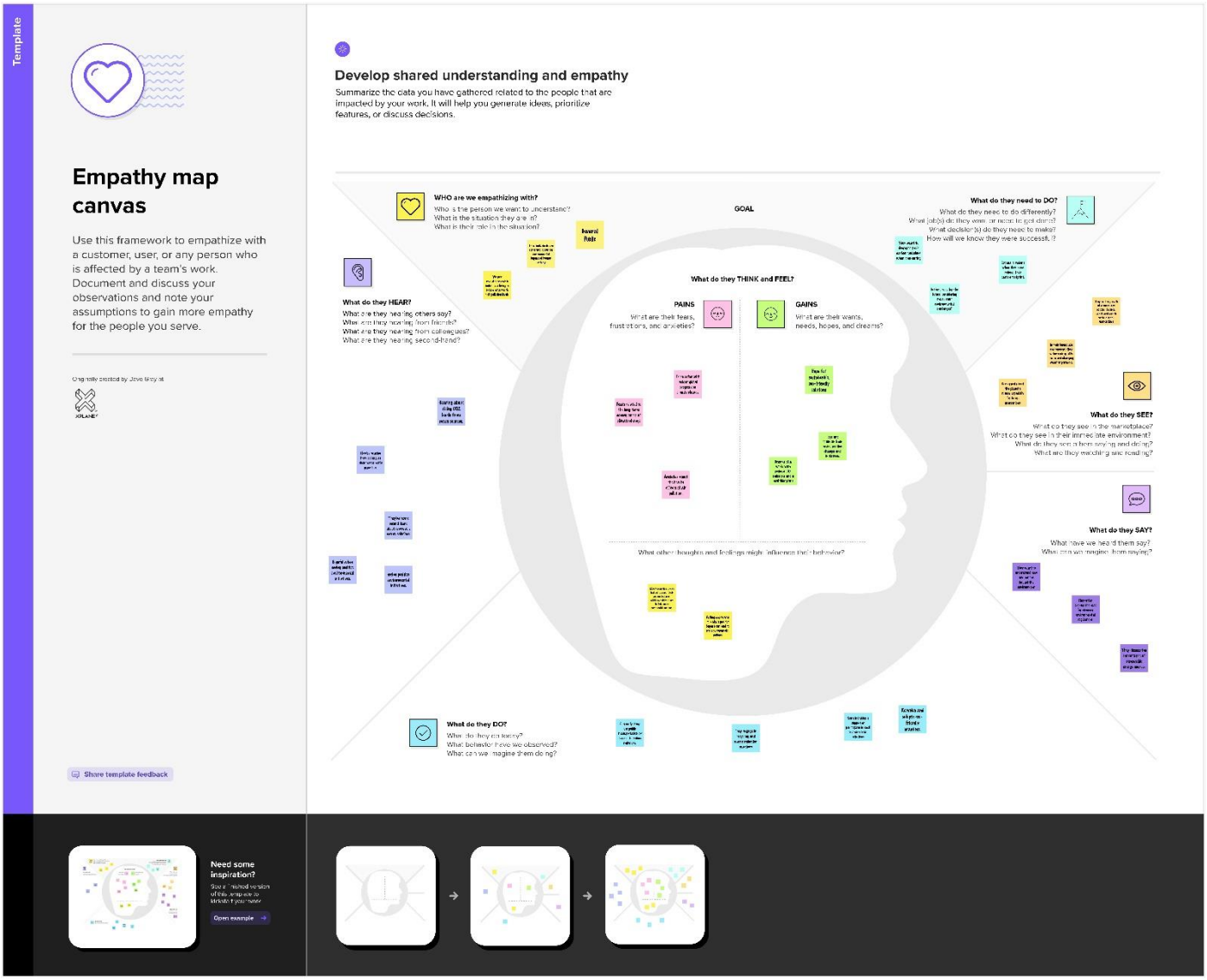

### *2.3 Problem Statement Definition:*

1) The problem statement defines the issue as understanding and mitigating the environmental impact of human-driven CO2 emissions.
2) The focus is on analysing the causes and effects of CO2 emissions, and proposing actionable solutions for a more sustainable future.

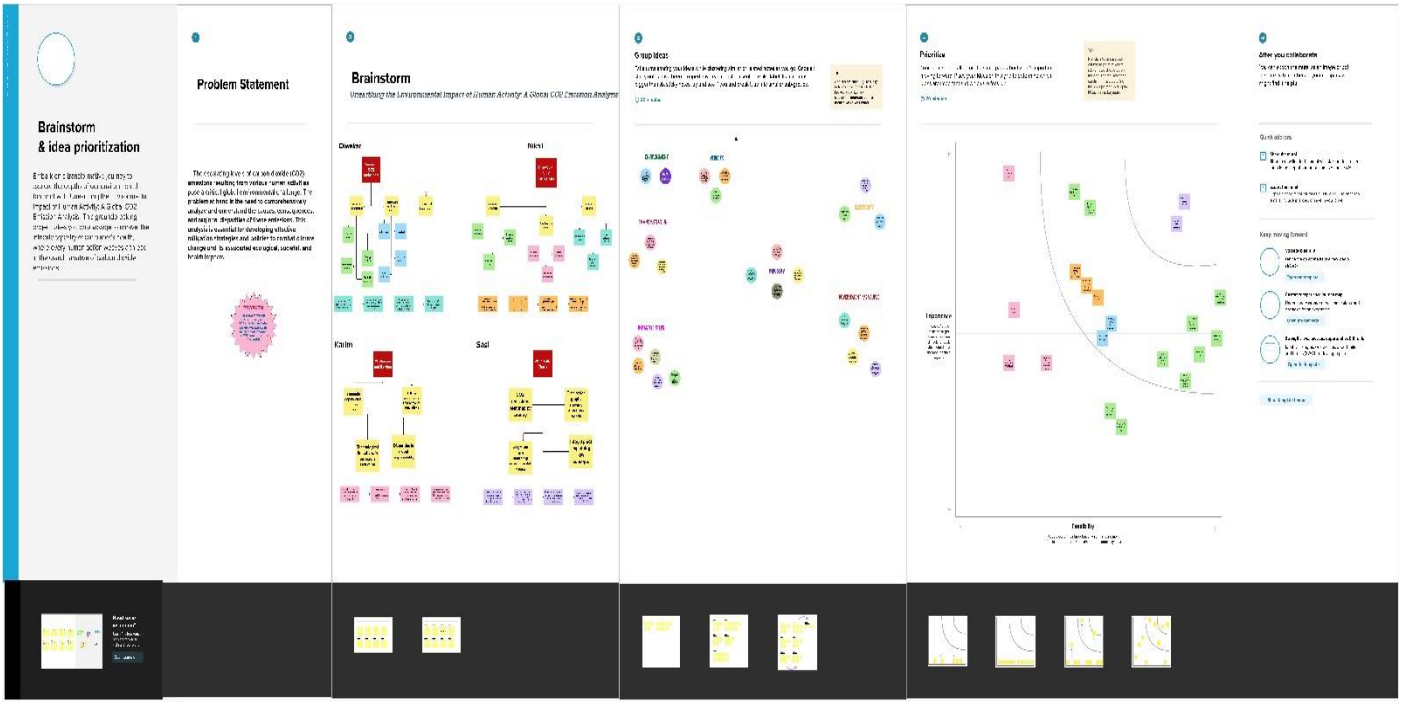
## 3.IDEATION AND PROPOSED SOLUTION:

The project's core idea involves conducting a comprehensive data analysis of global CO2 emissions. It will focus on the primary source of CO2 emissions, which is the burning of fossil fuels, and provide nation-wise data detailing annual changes. This analysis aims to help researchers gain insights into the factors driving global warming, paving the way for data-driven decisions and environmental policies.

## *3.1 Empathy map canvas:*



## *3.2 Ideation Brainstorm:*




# 4.REQUIREMENT ANALYSIS

## *4.1Functional requirement:*

- Data Collection and Integration:

  The system should be able to collect and integrate CO2 emission data from various sources, including governmental agencies, research institutions, and satellite measurements.

- Data Analysis and Processing:

  The system should be able to process and analyze the collected data to calculate global and regional CO2 emissions and identify trends and patterns.

- Trend Analysis and Prediction**:**

  The project should be able to analyze historical data to identify trends and make predictions about future CO2 emissions based on different scenarios.

- User Interface:

  The system should have a user-friendly interface that allows users to easily navigate through the data, view visualizations, and customize their analyses.

### *4.2Non-Functional requirements:*

- Scalability:

  The system should be scalable to handle a large volume of data and growing user demand as more data becomes available.

- Performance:

  The system should provide fast data processing and respond to user queries promptly, ensuring an efficient user experience.

- Accessibility:

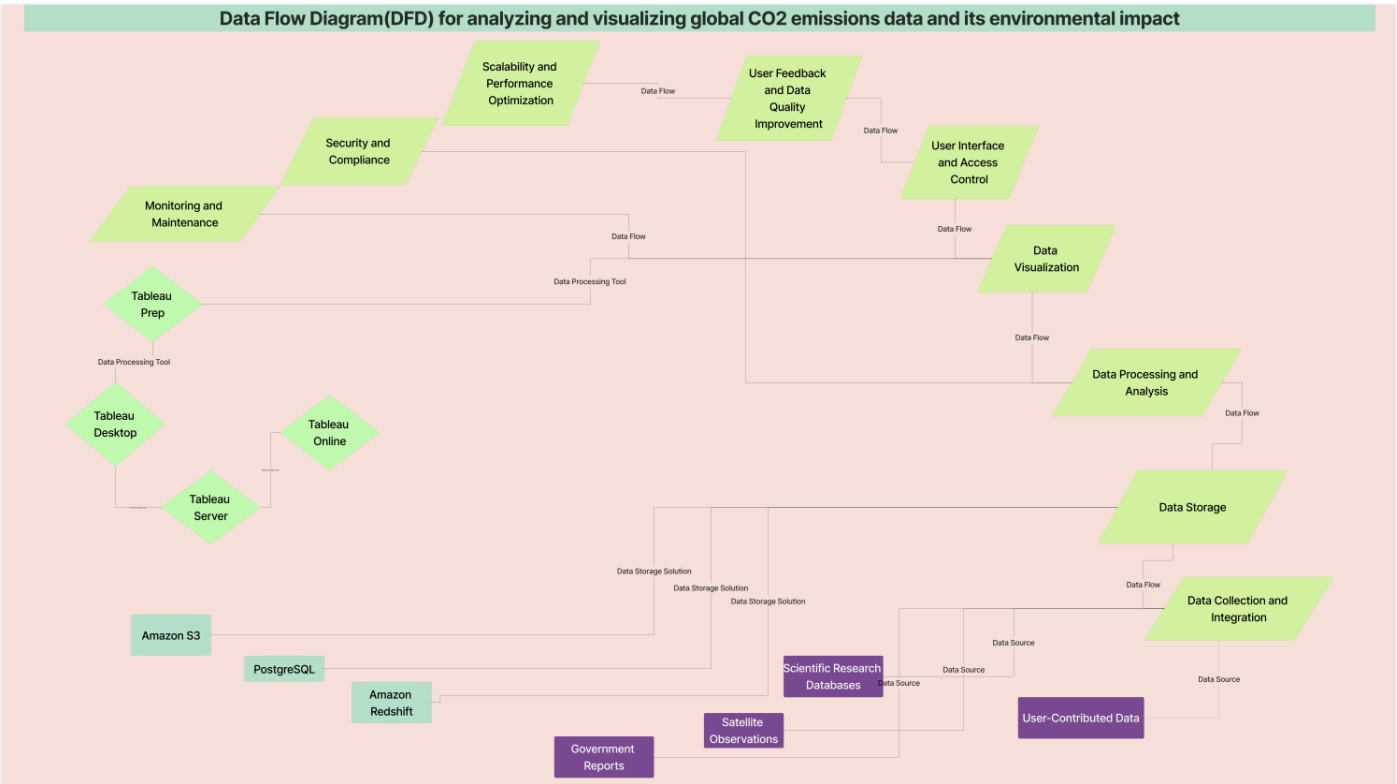
  The project should be accessible to users with disabilities, adhering to relevant accessibility standards.

- Compliance:

  The system should comply with relevant data and environmental regulations, such as GDPR and environmental data reporting standards.

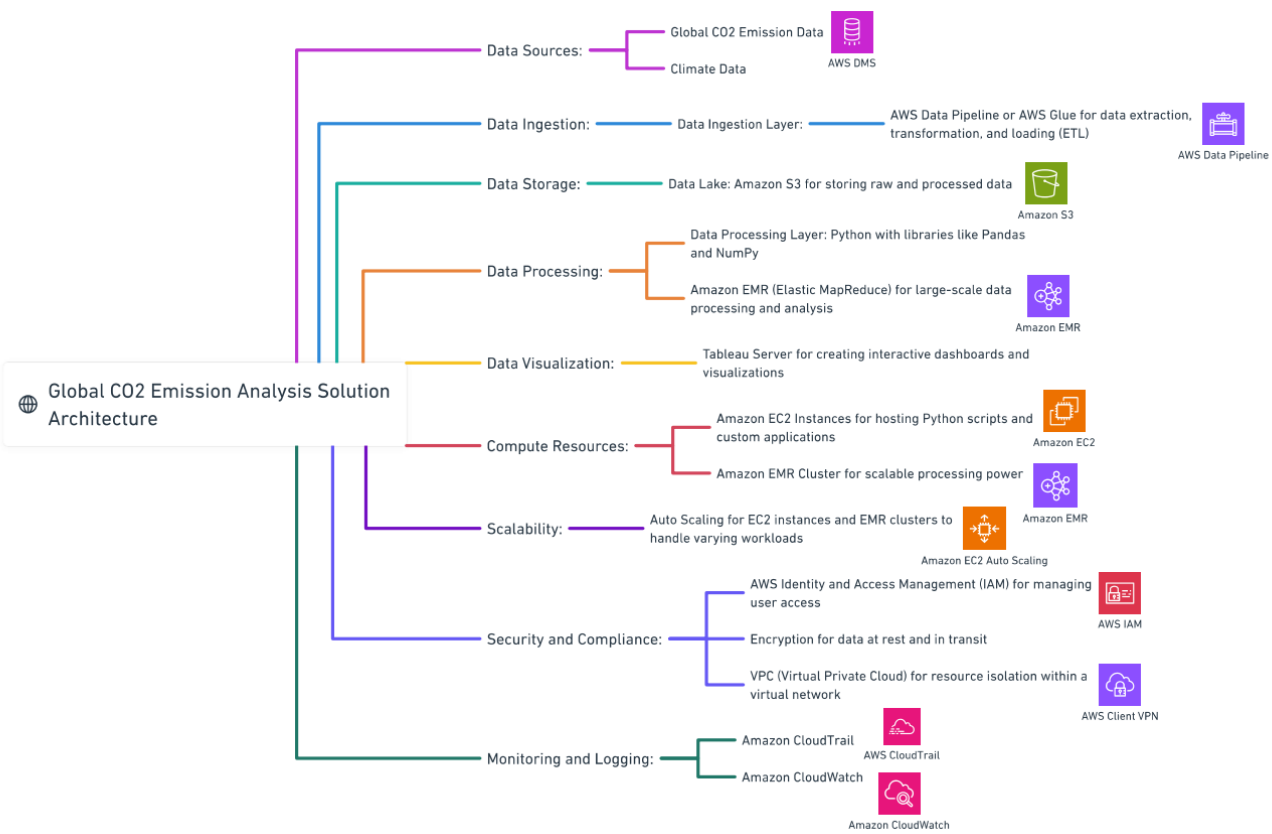
## 5.PROJECT DESIGN

### *5.1Data Flow Diagrams & User Stories*




It explains the visualizing and gathering the data, and the solution architecture for the proposed problem.

## *5.2 Solution Architecture:*



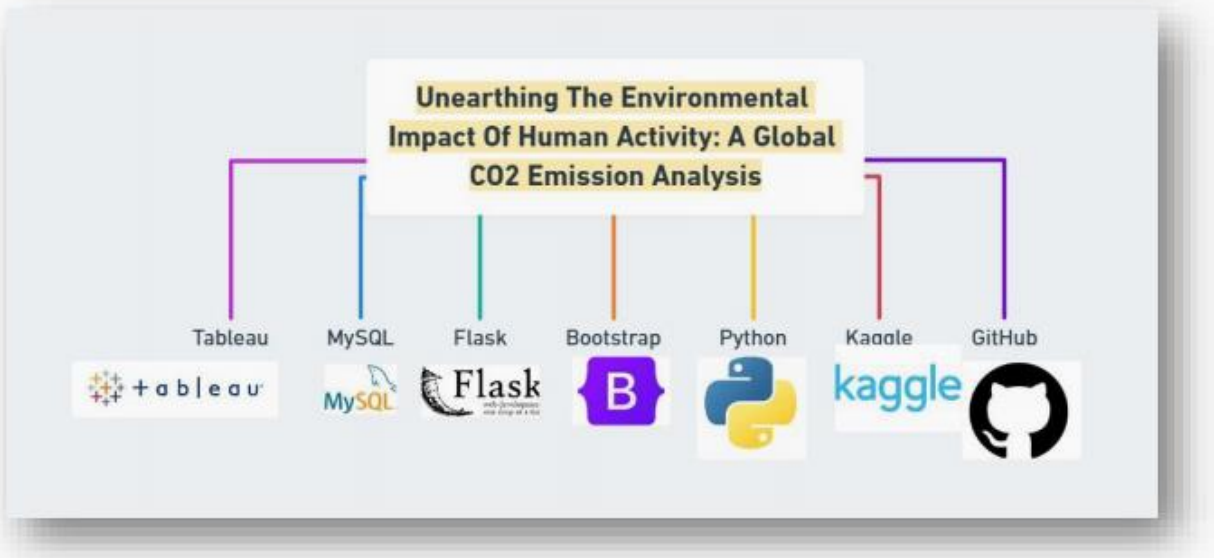

# 6.PROJECT PLANNING & SCHEDULING

### *6.1Technical Architecture:*

**Table-1: Components & Technologies:**

| S. No | Component | Description | Technology |
|---|---|---|---|
| 1 | Dataset from Kaggle | Data source for analysis | Kaggle dataset or other data sources |
| 2 | MySQL Database | Data storage, cleaning, preprocessing | MySQL database management |
| 3 | MySQL Connection with Tableau | Connect MySQL with Tableau for data extraction | Tableau Desktop for MySQL connection |
| 4 | Data Analysis and Visualization (Tableau) | Analyse data, create visualizations, dashboards | Tableau Desktop for data analysis and visualization |
| 5 | Publishing with Tableau Public | Publish dashboards and stories | Tableau Public for sharing |
| 6 | User Interface with Bootstrap | Create a user-friendly web interface | Bootstrap framework for web development |
| 7 | Integration with Flask | Develop a web application for hosting visuals | Flask for web application development |
| 8 | Website Integration | Embed Tableau visuals into the website | HTML, CSS, and JavaScript for web development |
| 9 | Version Control and Deployment (Git/GitHub) | Manage version control and deployment | Git for version control, GitHub for hosting |
| 10 | Deployment and Hosting | Deploy and host the web application | GitHub Pages and Hostinger web hosting services |

## Technology Stack:



## 6.2 **Sprint Planning & Estimation**

**Product Backlog**:

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|---|---|---|---|---|---|---|
| 1 | Project Ideation | US-001 | Gather requirements | 2 1/2 | Medium | Karim |
| 1 | Project Ideation | US-002 | Create Empathy Map | 2 1/2 | High | Nikhil |
| 1 | Project Ideation | US-003 | Brainstorm project ideas | 2 1/2 | High | Sasidhar |
| 1 | Project Ideation | US-004 | Define project scope | 2 1/2 | Medium | Diwakar |
| 2 | Project Design | US-005 | Develop proposed solution | 2 1/2 | Low | Diwakar |
| 2 | Project Design | US-001 | Define solution architecture | 2 1/2 | Medium | Nikhil |
| 2 | Project Design | US-002 | Create Data Flow Diagrams | 2 1/2 | Low | Nikhil |
| 2 | Project Design | US-003 | Prepare design requirements | 2 1/2 | Low | Karim |
| 3 | Project Planning | US-004 | Define technology stack | 2 | Medium | Sasidhar |
| 3 | Project Planning | US-005 | Prepare project planning | 2 | Low | Diwakar |
| 3 | Project Planning | US-001 | Set up development environments | 1 | Medium | Karim |
| 4 | Project Development - Part 1 | US-002 | Core feature development | 3 | Medium | Nikhil |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | Project Development - Part 1 | US-003 | Code layout and readability | 3 | Low | Sasidhar |
| 4 | Project Development - Part 2 | US-004 | Continue feature development | 3 | Medium | Diwakar |
| 4 | Project Development - Part 2 | US-005 | Focus on reusability | 3 | Low | Nikhil |
| 4 | Project Development - Part 3 | US-001 | Begin performance testing | 3 | High | Karim |
| 5 | Final Submission | US-002 | Finalize development | 5 | Medium | Nikhil |
| 5 | Final Submission | US-003 | Complete performance testing | 5 | Medium | Sasidhar |
| 5 | Final Submission | US-004 | Prepare for final submission | 5 | High | Diwakar |

### *6.3 Sprint Delivery Schedule:*

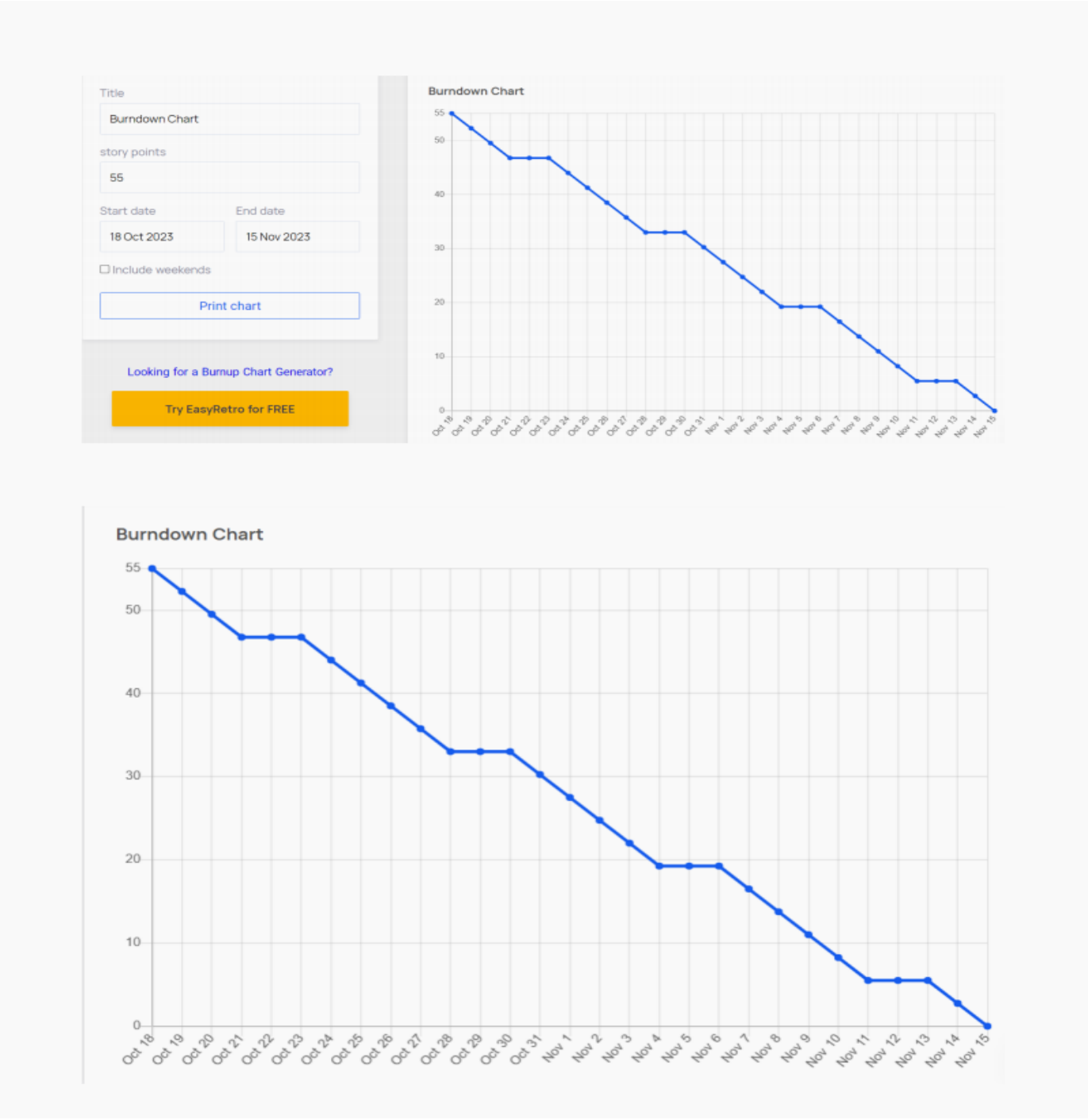
| Sprint | Start Date | End Date | Focus |
|---|---|---|---|
| 1 | 18-10-2023 | 24-10-2023 | Ideation |
| 2 | 23-10-2023 | 29-10-2023 | Design |
| 3 | 27-10-2023 | 02-11-2023 | Planning |
| 4 | 06-11-2023 | 12-11-2023 | Dev Pt. 1 |
| 5 | 09-11-2023 | 15-11-2023 | Dev Pt. 2 |

| Sprint | Total Story Points | Duration | Sprint Start Date | Sprint End Date (Planned) | Story Points Completed (as on Planned End Date) | Sprint Release Date (Actual) |
|---|---|---|---|---|---|---|
| Sprint-1 | 10 | 6 Days | 18-10-2023 | 24-10-2023 | 10 | 24-10-2023 |
| Sprint-2 | 10 | 6 Days | 23-10-2023 | 29-10-2023 | 10 | 29-10-2023 |
| Sprint-3 | 5 | 7 Days | 27-10-2023 | 02-11-2023 | 5 | 02-11-2023 |
| Sprint-4 | 15 | 7 Days | 06-11-2023 | 12-11-2023 | 15 | 12-11-2023 |
| Sprint-5 | 15 | 7 Days | 09-11-2023 | 15-11-2023 | 15 | 15-11-2023 |

**Average Velocity Calculation:**
Average Velocity (AV) per iteration unit (story points per day) can be calculated by dividing the total story points completed by the total duration across all sprints.
Total Story Points Completed: 10 + 10 + 5 + 15 + 15 = 55
Total Duration: 6 + 6 + 7 + 7 + 7 = 33 days
Average Velocity (AV) = Total Story Points Completed / Total Duration
Average Velocity (AV) = 55 / 33 ≈ 1.67 story points per day

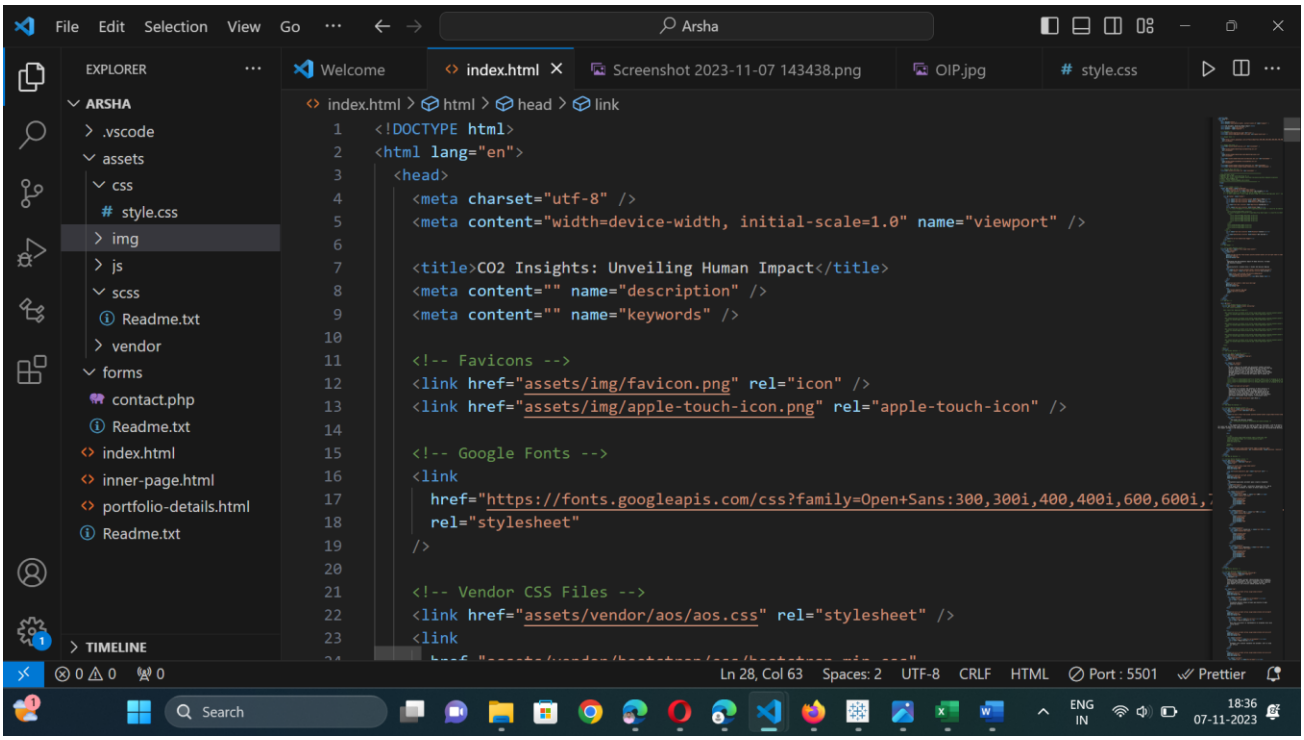
## Burn-down Chart:

A burn-down chart typically tracks the remaining work (story points) over time. Since you've provided the planned and actual release dates for each sprint, we can create a chart that shows the progress over time. The remaining work will be calculated as the planned story points minus the completed story points for each sprint.

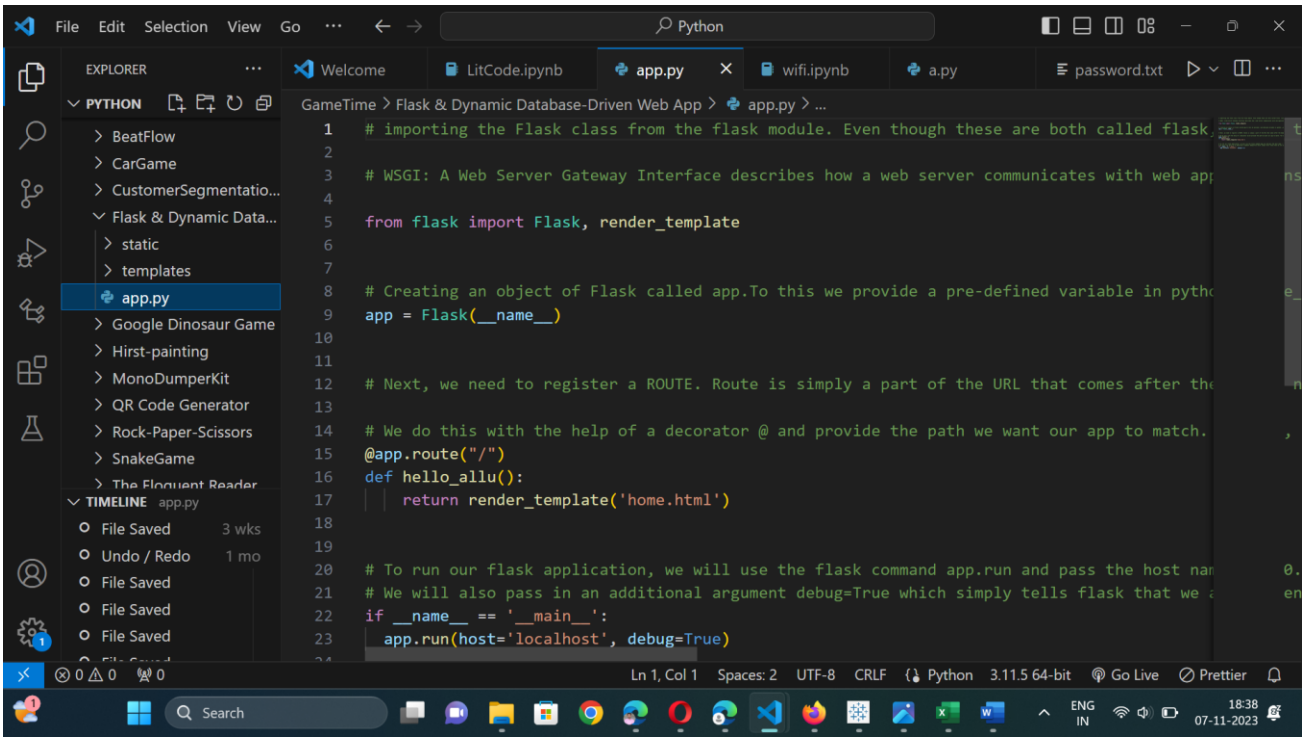


# 7.CODING & SOLUTIONING

## 1.1 Feature 1: Customising Bootstrap template.




## 1.2 Feature 2: Flask integration:



## 8. PERFORMANCE TESTING

Performance testing in a data analytics project typically focuses on measuring the efficiency and effectiveness of data processing, storage, and analysis.

### *8.1Performance Metrics:*

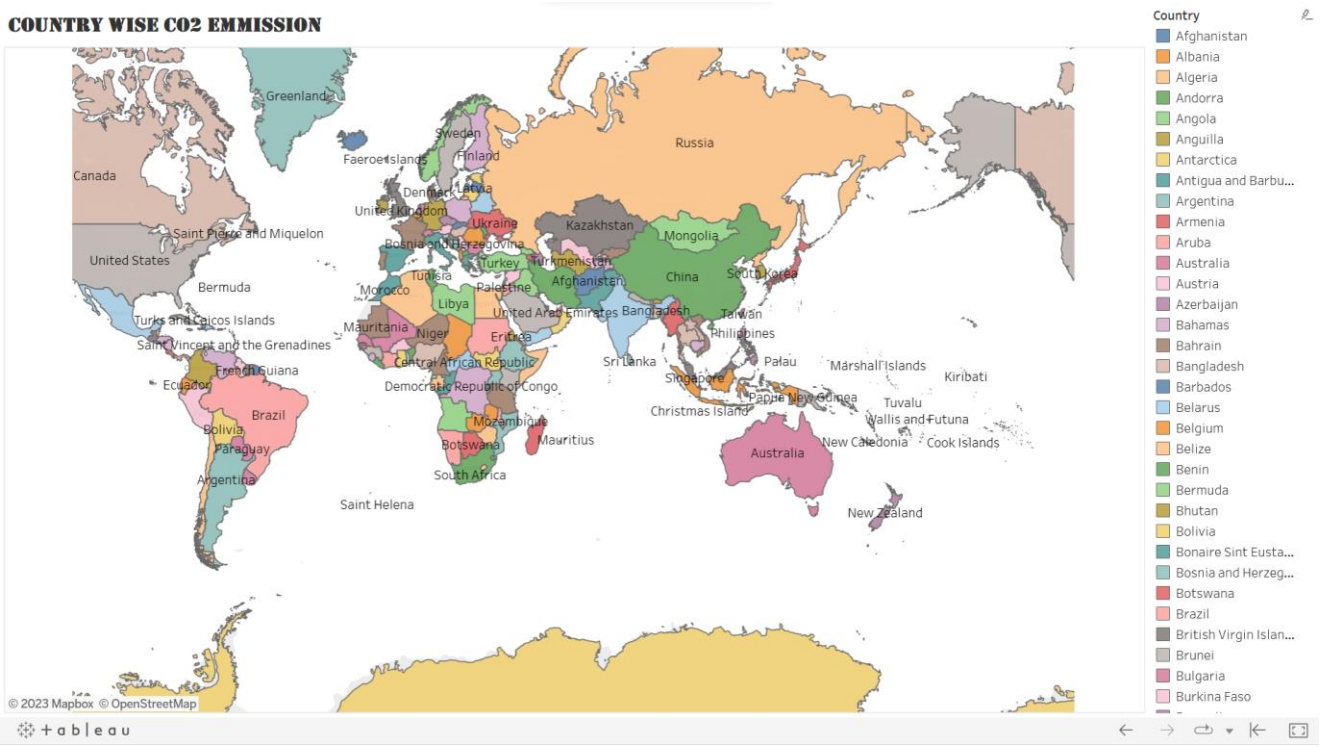
Data Ingestion Rate: Measure the speed at which data is ingested into the system. This includes factors like data transfer rates, file processing times, and data extraction from various sources. Batch processing: 1,000 - 10,000 records per minute

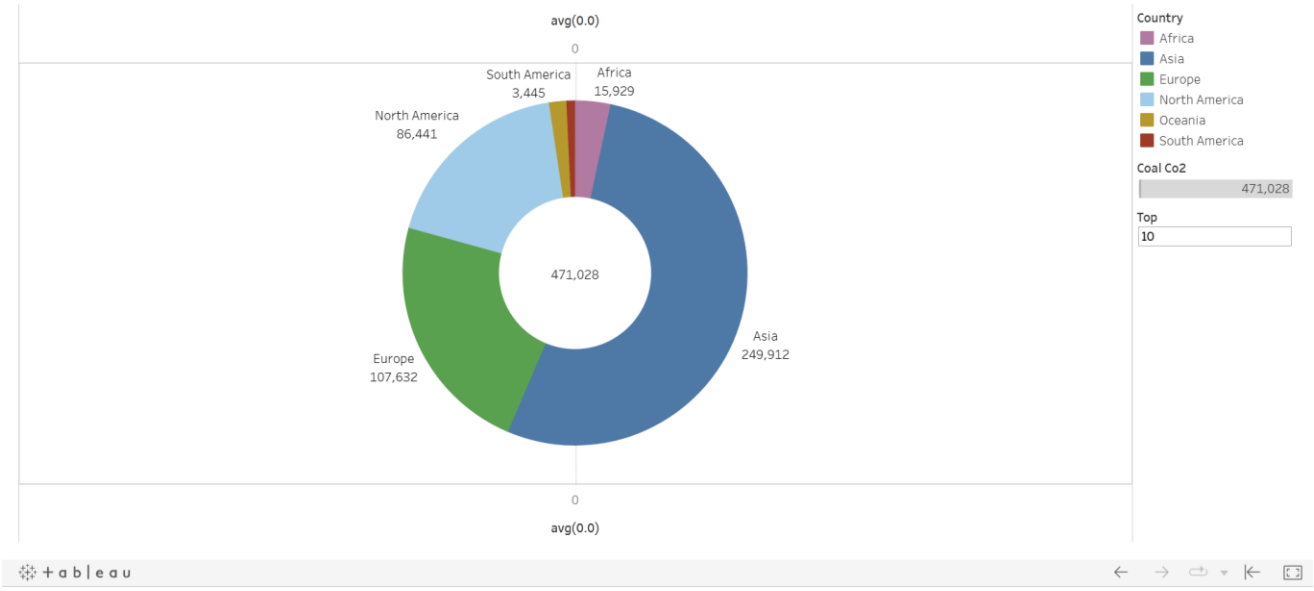
Data Processing Speed: Evaluate the time it takes to process and clean the data. This could include ETL (Extract, Transform, Load) processes or any data preparation tasks.

Resource Utilization:
CPU utilization: Below 70-80% on average
Memory utilization: Below 70-80% on average
Storage utilization: Varies based on data volume but below 80-90%

## 9. RESULTS

### *9.1Output Screenshots*

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Africa
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North America
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Asia
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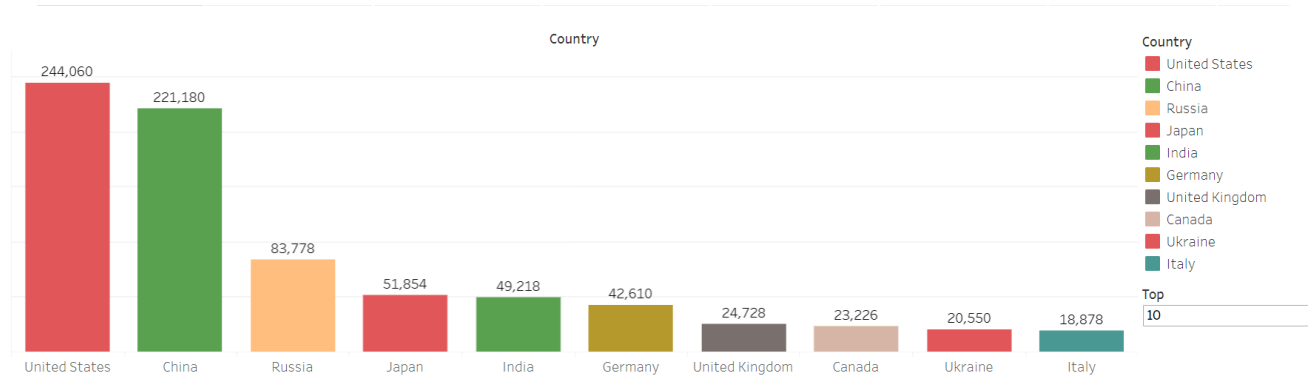
Asia
Europe
North America
Oceania
South America
Coal Co2
471,028
Top
10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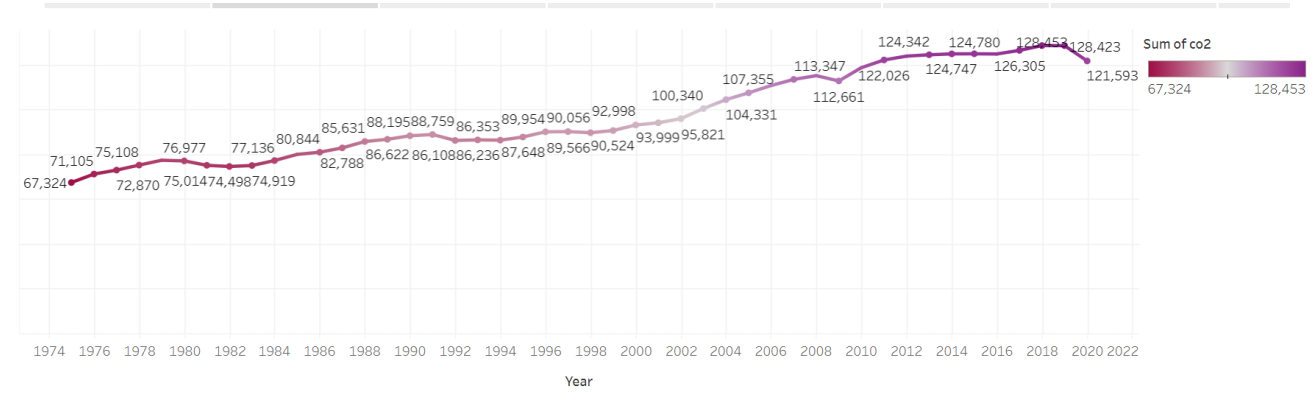
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Year
Sum of co2
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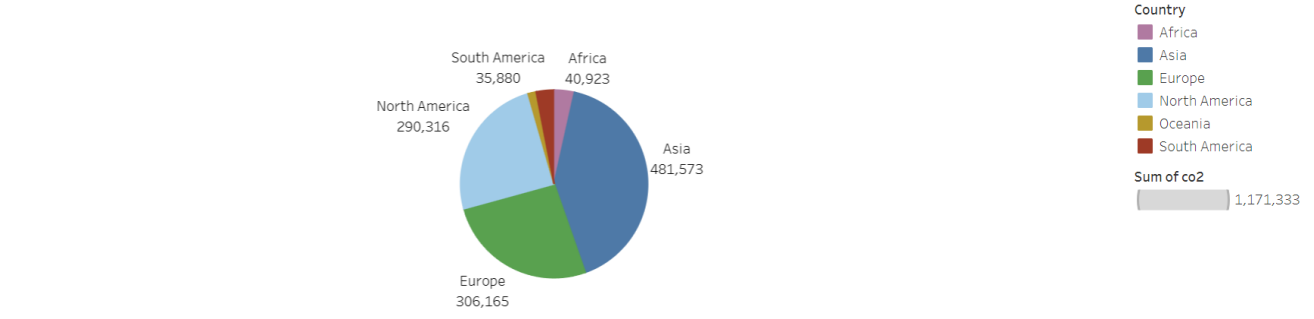
128,453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North America
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Asia
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Europe
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Country
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Asia
Europe
North America
Oceania
South America
Sum of co2
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## 10.ADVANTAGES & DISADVANTAGES

**Advantages:**

1. **Increased Awareness:**

   The project can raise awareness about the environmental impact of human activities and help individuals, organizations, and governments make more informed decisions to reduce CO2 emissions.

2. **Informed Policy Decisions:**

   Policymakers can use the project's insights to create evidence-based policies and regulations aimed at mitigating the environmental impact.

3. **Scientific Insights:**

   The analysis can provide valuable insights for scientific research, aiding in a better understanding of climate change and its drivers.

4. **Data-Driven Decision Making:**

   Users can make data-driven decisions to reduce their carbon footprint, leading to more sustainable lifestyles and business practices.

5. **Public Engagement:**

   The project can engage the public in environmental issues, fostering a sense of responsibility and encouraging collective action.

**Disadvantages:**

1. **Data Complexity:**

   The project deals with vast and complex datasets, making data management, integration, and analysis challenging and resource-intensive.

2. **Resource Intensive:**

   Developing and maintaining the necessary infrastructure and data sources can be costly, requiring significant financial and technical resources.

3. **Data Accuracy:**

Data accuracy is paramount for reliable analysis, and inaccuracies or biases in data sources can lead to erroneous conclusions.

4. **Privacy Concerns:**

   Collecting and analyzing data on human activities may raise privacy concerns, necessitating careful data handling and compliance with regulations.

5. **Changing Environmental Factors:**

   Environmental factors are subject to change, and the project's predictions may be affected by unforeseen events or shifts in human behavior and policies.

## 11.CONCLUSION

In conclusion, "Unearthing the Environmental Impact of Human Activity: A Global CO2 Emission Analysis" serves as a vital tool in our collective efforts to combat climate change and its associated challenges. By providing comprehensive insights into the environmental consequences of human actions, it promotes awareness and informed decision-making. Through scientific rigor and data-driven evidence, it facilitates the formulation of effective environmental policies and regulations. The project's emphasis on public engagement and individual responsibility encourages a more sustainable way of life. However, it is not without challenges, including the complexities of managing vast datasets and addressing potential privacy concerns. In a rapidly changing world, this project remains an invaluable asset in our pursuit of a cleaner, greener future.

## 12. FUTURE SCOPE:

1. **Enhanced Predictive Models:** Improve predictive models to offer more accurate future climate change scenarios based on different emissions and policy scenarios.
2. **Integration of Real-time Data:** Incorporate real-time data sources for immediate updates on emissions, such as tracking the impact of climate events like wildfires and industrial accidents.
3. **Big Data Integration:** Integrating big data technologies to handle and analyze the ever-increasing volume of environmental data effectively.
4. **Predictive Analytics:** Developing advanced predictive models to forecast the impact of CO2 emissions on the environment and human health with greater accuracy.
5. **Real-time Monitoring:** Implementing real-time monitoring and analytics to provide up-to-the-minute information on environmental changes and emissions.

## 13. APPENDIX Source Code

GitHub & Project Demo Link