MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE ,RASIPURAM

"Unearthing the Environmental Impact of Human Activity: A Global CO2 Emission Analysis".

Our Team,

Team Leader: KARTHIK.M(20UEL1058)

Team members: KARTHIK RAJA.M(20UEL1059)

MALARAVAN.E(20UEL1060)

MOULEESWARAN.M(20UEL1061)

"Unearthing the Environmental Impact of Human Activity: A Global CO2 Emission Analysis."

# CO2 Emission Analysis."

Project Description

.
Determine the exclusive global amount of carbon dioxide and other greenhouse gases accumulated over the full lifecycle of a product, service, or operation.

Combustion of fossil fuels (coal, natural gas, and oil) for energy and transportation.
Certain industrial processes and land-use changes also emit CO2. The main sources of CO2 emissions in the United States are described below. Transportation.

Carbon dioxide emissions per therm are determined by converting million British thermal units (mmbtu) to therms, then multiplying the carbon coefficient times the fraction oxidized times the ratio of the molecular weight of carbon dioxide to carbon (44/12).

TechnicalArchitecture
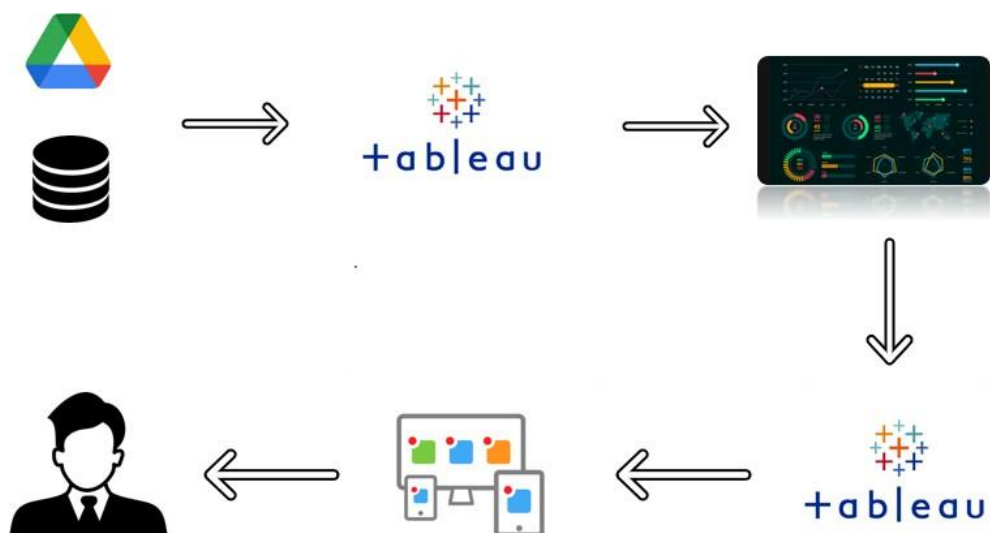
Project Flow

Toaccomplishthis,wehavetocompletealltheactivitieslistedbelow,

- DefineProblem/ProblemUnderstandingo
  - Specifythebusinessproblem
    - o Businessrequirements
    - o LiteratureSurvey
    - o SocialorBusinessImpact.
- DataCollection&ExtractionfromDatabase
  - o Collectthedataset,
  - o StoringDatainDB
  - o PerformSQLOperations
  - o ConnectDBwithTableau
- DataPreparation
  - o PreparetheDataforVisualization
- DataVisualizations
  - o NoofUniqueVisualizations
- Dashboard
  - o ResponsiveandDesignofDashboard
- Story
  - o NoofScenesofStory
- PerformanceTesting
  - o AmountofDataRenderedtoDB'
  - o UtilizationofDataFilters
  - o NoofCalculationFields
  - o NoofVisualizations/Graphs
- WebIntegration
  - o DashboardandStoryembedwithUIWithFlask
- ProjectDemonstration&Documentation
  - o RecordexplanationVideoforprojectendtoendsolution
  - o ProjectDocumentation-Stepbystepprojectdevelopmentprocedure

Milestone1:DefineProblem/ProblemUnderstanding

Activity 1: Specify the business problem

Refer Project Description

Activity 2: Business requirements

A Carbon audit, sometimes referred to as a 'carbon footprint', is a means of measuring and recording the greenhouse gas (GHG) emissions of an organization or building within a defined system boundary.

The formula to calculate the carbon footprint of a business is simple: the result is obtained by multiplying the activity (or consumption) data by its corresponding emission factor. Based on this formula, there are several methodologies to calculate the carbon footprint (UNE-ISO 14064, GHG Protocol, etc).

Statutory Audit as the name suggests is a compulsory audit for all companies. Every entity which is registered under the Companies Act, as a Private Limited or a Public Limited company has to get its books of accounts audited every year.

Activity3:LiteratureSurvey(StudentWillWrite)

The carbon (and oxygen) in CO_2 can be used as an alternative to fossil fuels in th production of chemicals, including plastics, fibres and synthetic rubber. As with CO_2- derived fuels,converting CO_2 to methanol and methane is the most technologically mature pathway.

Carbon dioxide in the atmosphere warms the planet, causing climate change. Human activities have raised the atmosphere's carbon dioxide content by 50% in less than 200 years.

What is carbon dioxide? Carbon dioxide is the fourth most abundant gas in the earth's atmosphere.At room temperature, carbon dioxide (CO_2) is a colorless, odorless, non-flammable gas, at other temperatures and pressures, carbon dioxide can be a liquid or a solid.

Activity 4: Social or Business Impact..

An extra ton of carbon emissions shortens lifespans, hurts crops, and causes sea levels to rise, decreasing property values. An SCC of $51 means that economists and climate scientists expect the total damages from an extra ton of carbon emissions to equal $51 a ton.

Higher carbon footprint is indicative of greater energy costs. Expenditure on energy bills could be channeled to other areas of the business that require more attention.

Scientific studies show that climate change will have, and in some cases has already had, severe consequences for society, like the spread of disease, increased food insecurity, and coastal destruction**..**

Milestone2:DataCollection&ExtractionfromDatabase

Data collection is the process of gathering and measuring information on variables of interest, in anestablishedsystematicfashionthatenablesonetoanswerstatedresearchquestions,testhypotheses,and evaluateoutcomesandgenerateinsightsfromthedata.

Activity 1: Collect the dataset

Pleaseuse the link to download the dataset:

Activity1.1:Understand the data:

Greenhouse gas concentrations are measured in parts per million, parts per billion, and even parts per trillion. One part per million is equivalent to one drop of water diluted into about 13 gallons of liquid (roughly the fuel tank of a compact car).

Carbon dioxide (CO2): Fossil fuel use is the primary source of CO2. CO2 can also be emitted from direct human-induced impacts on forestry and other land use, such as through deforestation, land clearing for agriculture, and degradation of soils.

CO2 is measured as parts per million (ppm), which is numerically equivalent to micromoles of CO2 per mole of air. The SI unit for CO2 concentration is µmol per mol.

Column Description for CO2Emission Analysis Data Clean:

Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring. Source. Climate Watch. 2020.

Natural sources of carbon dioxide include most animals, which exhale carbon dioxide as a waste product. Human activities that lead to carbon dioxide emissions come primarily from energy production, including burning coal, oil, or natural gas.

Because air pollution and greenhouse gases are often released from the same sources, cutting greenhouse gas emissions in an effort to slow climate change also reduces air pollutants, such as fine particulate matter (PM2.5). Reducing these co-emitted air pollutants improves air quality and benefits human health.

Activity 2: Storing Data in DB & Perform SQLOperations

Storing Data in DB & Connect DB with Tableau

Explanation video link:

https://drive.google.com/file/d/1WUK_E6SJbev4eByoyGUlubsJ2yiifvgz/view?usp=sharing

Milestone3:DataPreparation

Activity1:Preparethe DataforVisualization

Preparing the data for visualization involves cleaning the data to remove irrelevant or missingdata, transforming the data into a format that can be easily visualized, exploring the data toidentify patterns and trends, filtering the data to focus on specific subsets of data, preparingthe data for visualization software, and ensuring the data is accurate and complete. Thisprocesshelpstomakethedataeasilyunderstandableandreadyforcreatingvisualizationstogain insightsintotheperformanceandefficiency.

Milestone4:DataVisualization

Datavisualizationistheprocessofcreatinggraphicalrepresentationsofdatainordertohelppeopleunderstand and explore the information. The goal of data visualization is to make complex data setsmore 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 thedata.
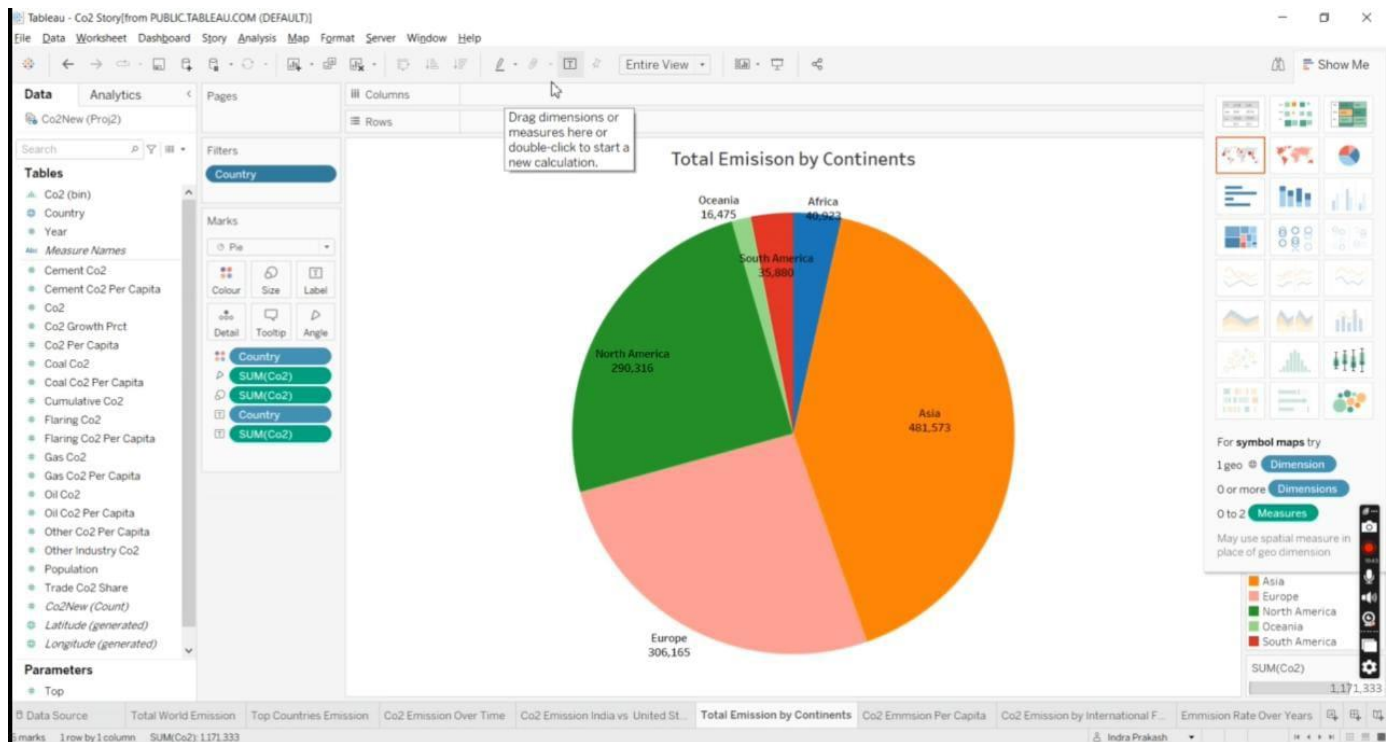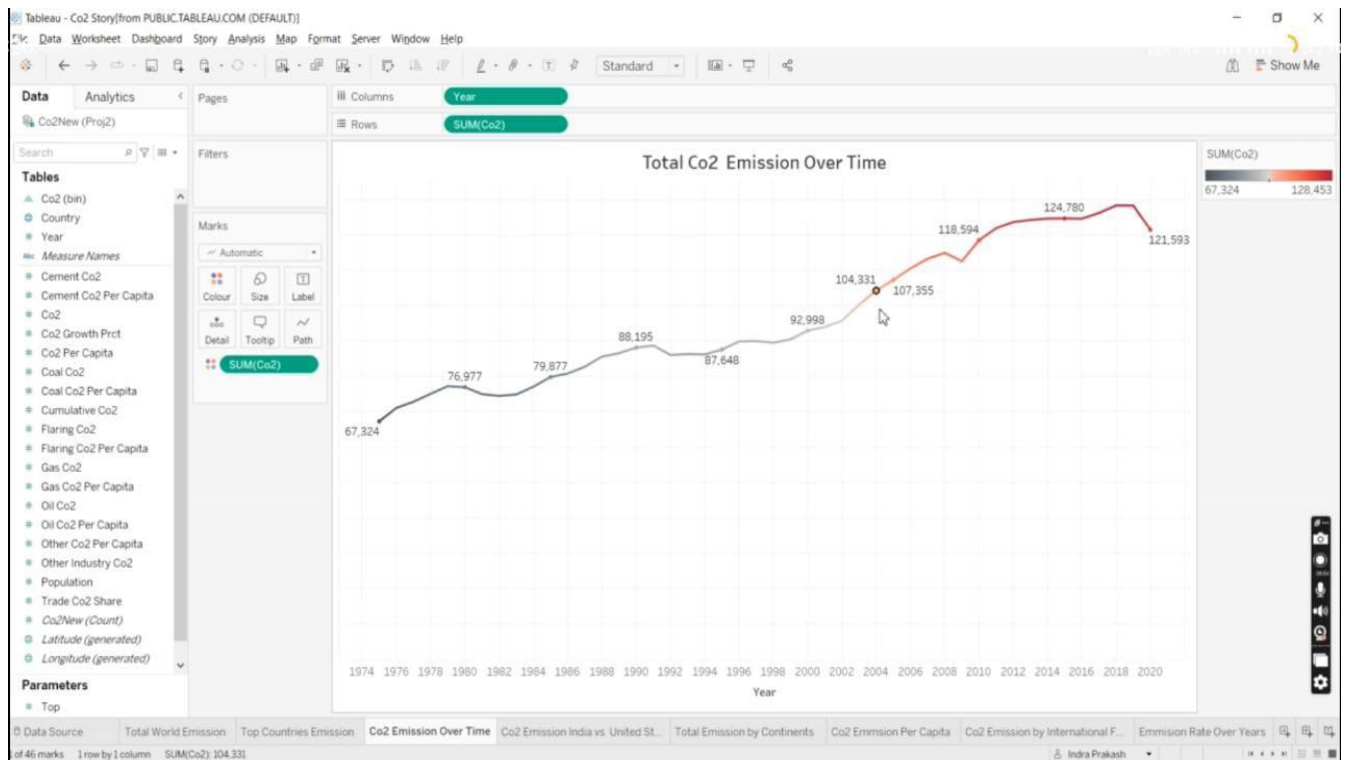
Activity1:NoofUniqueVisualizations

Activity1.1: Understand- Total World Emission,
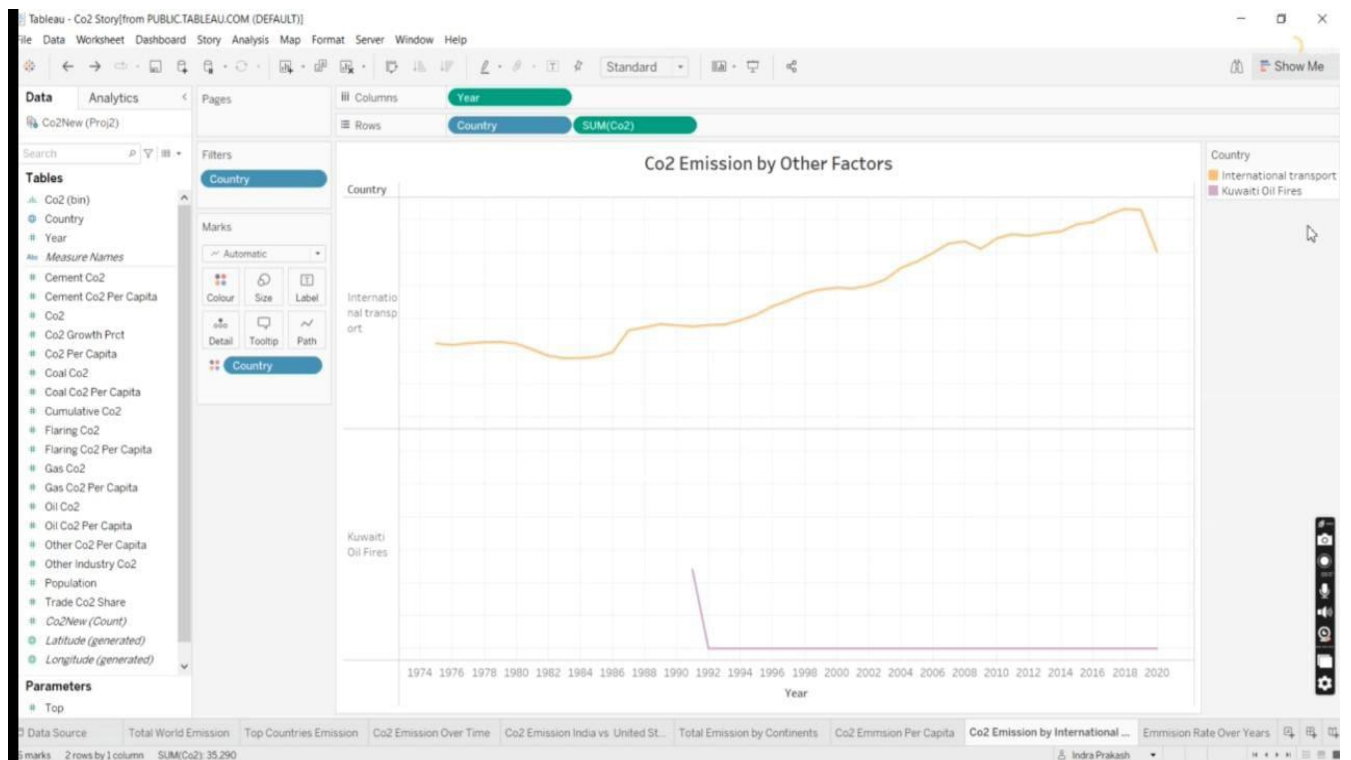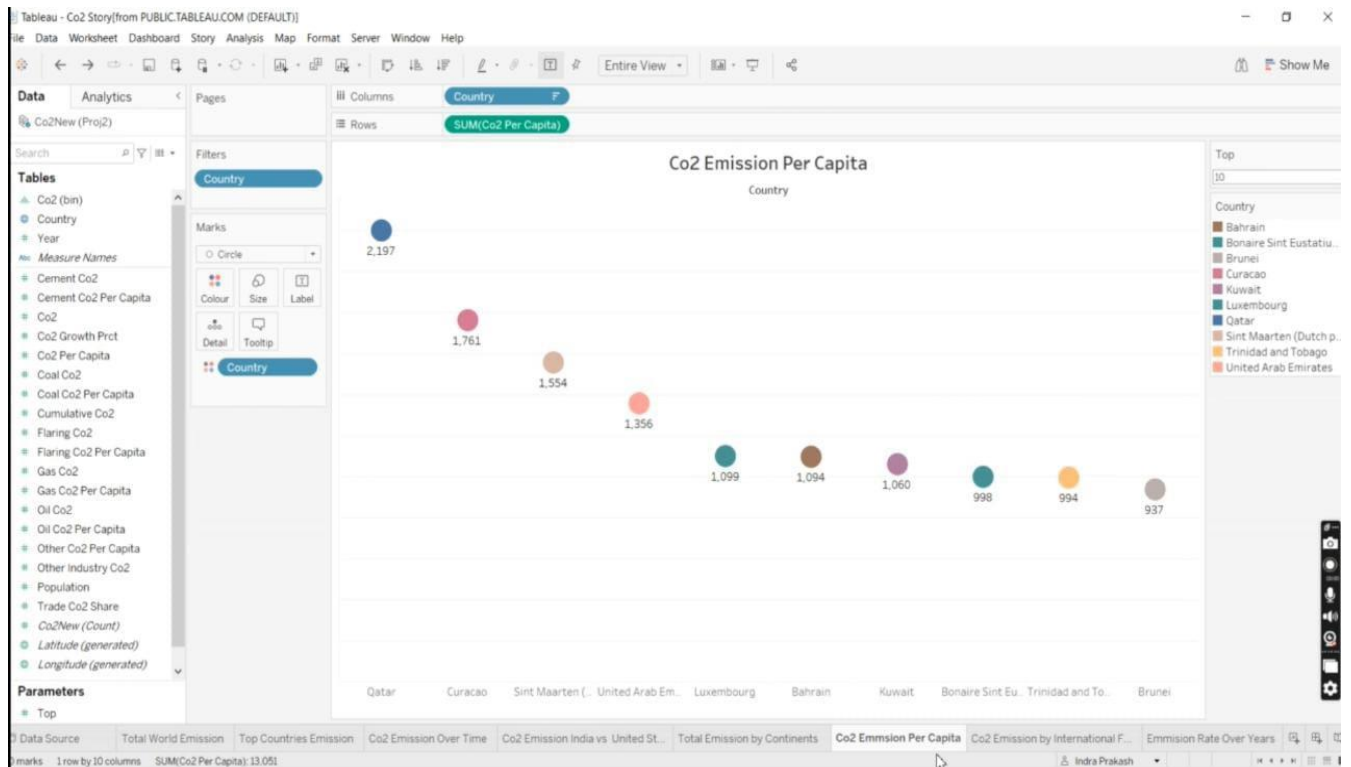### Co2 Emission over Time, Total Emission by
Continent
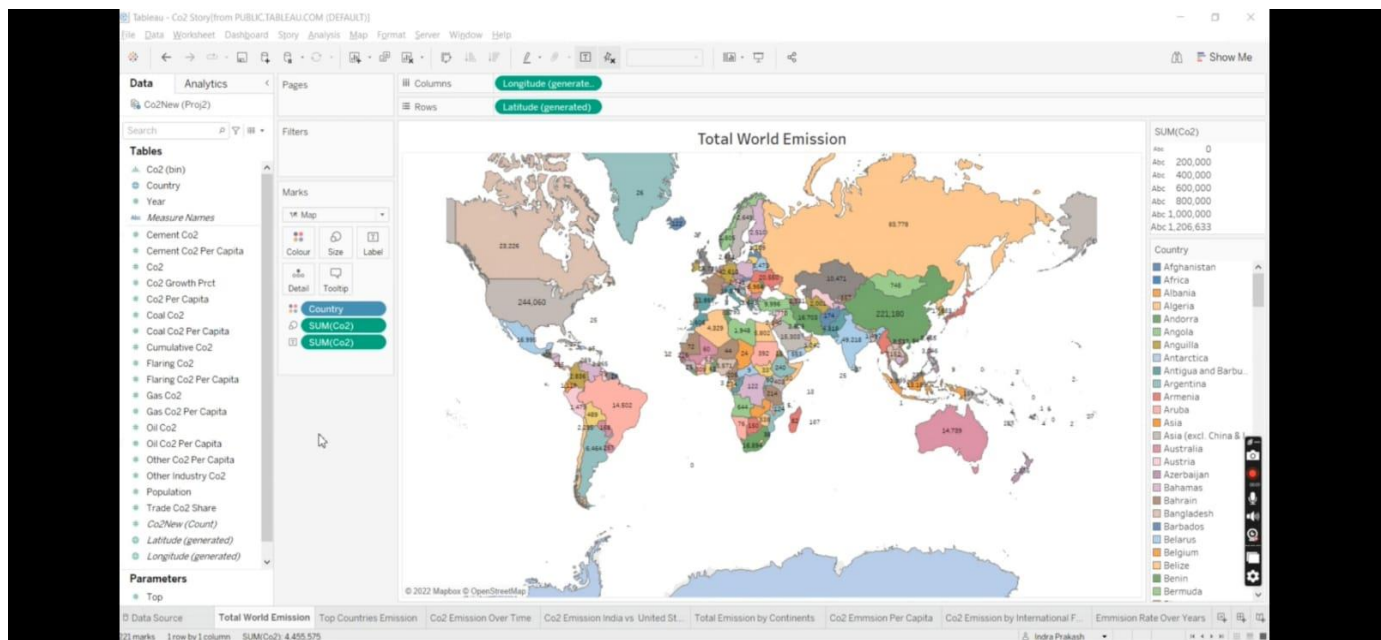
Global carban dioxide (co2) Emission from energy combustion and

industrial processes 1 grew 0.9% or 321 MT in 2022 to a new all-time high
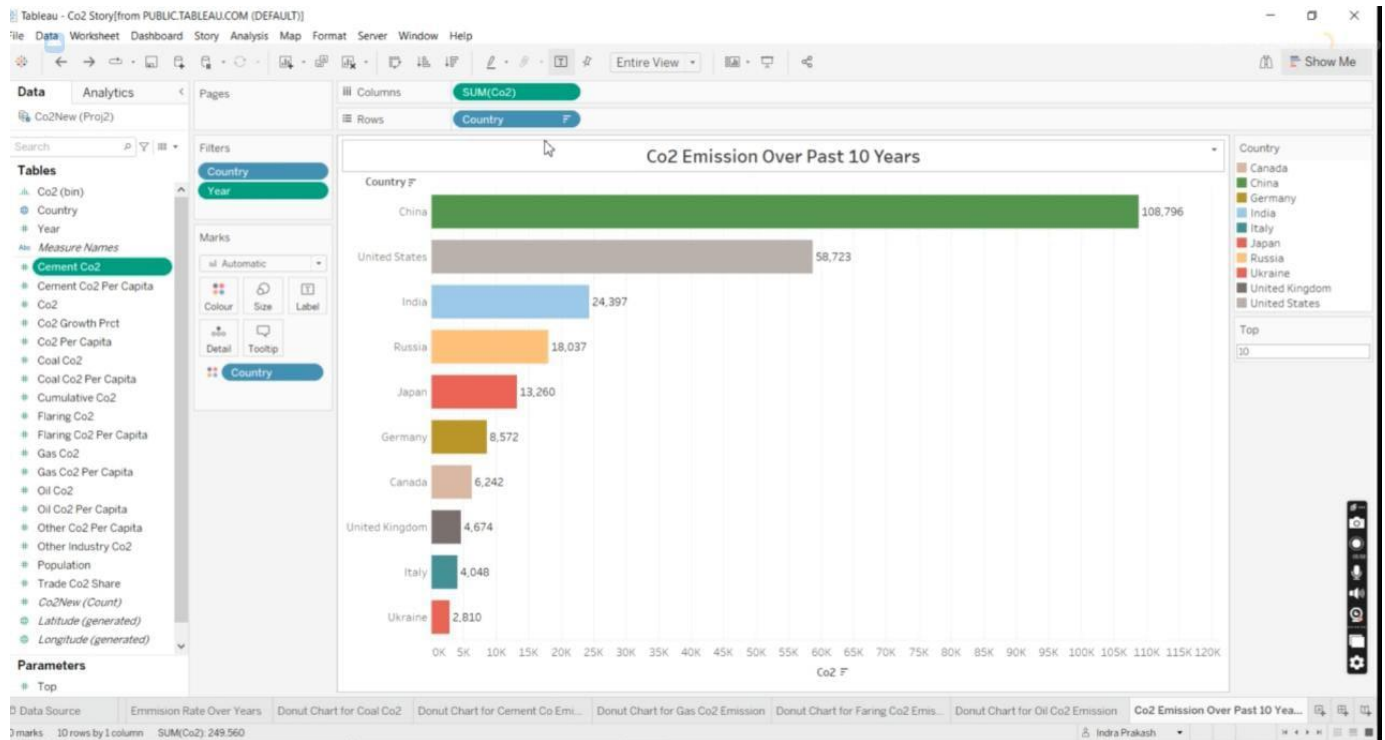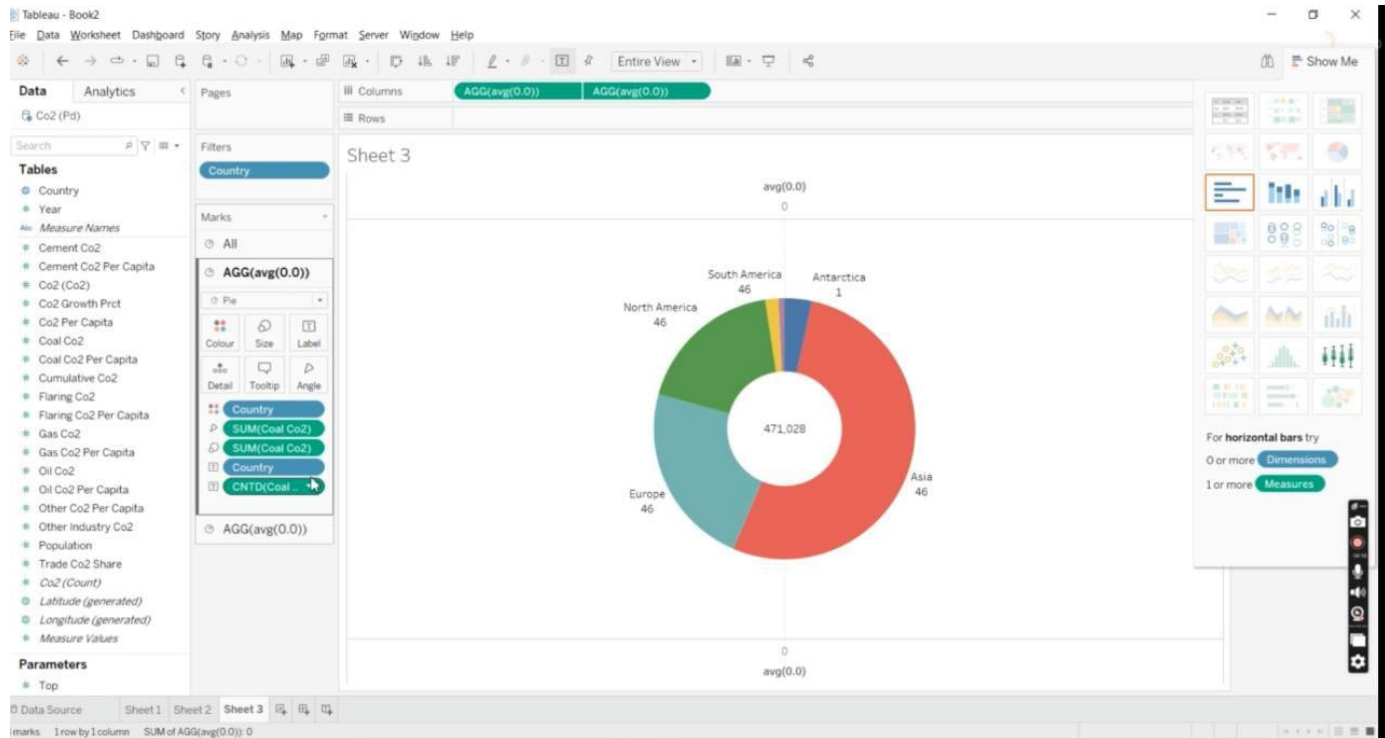
of 36.8GT.

Sheet 2

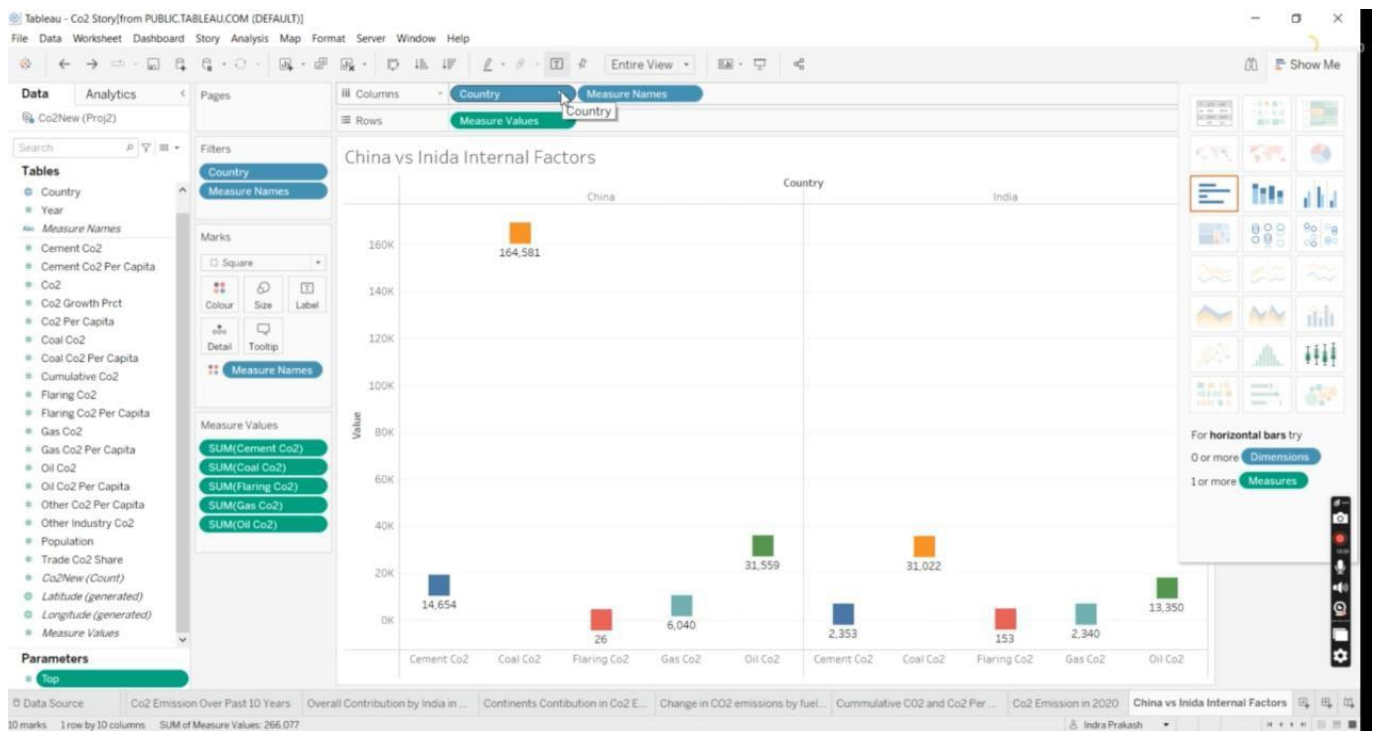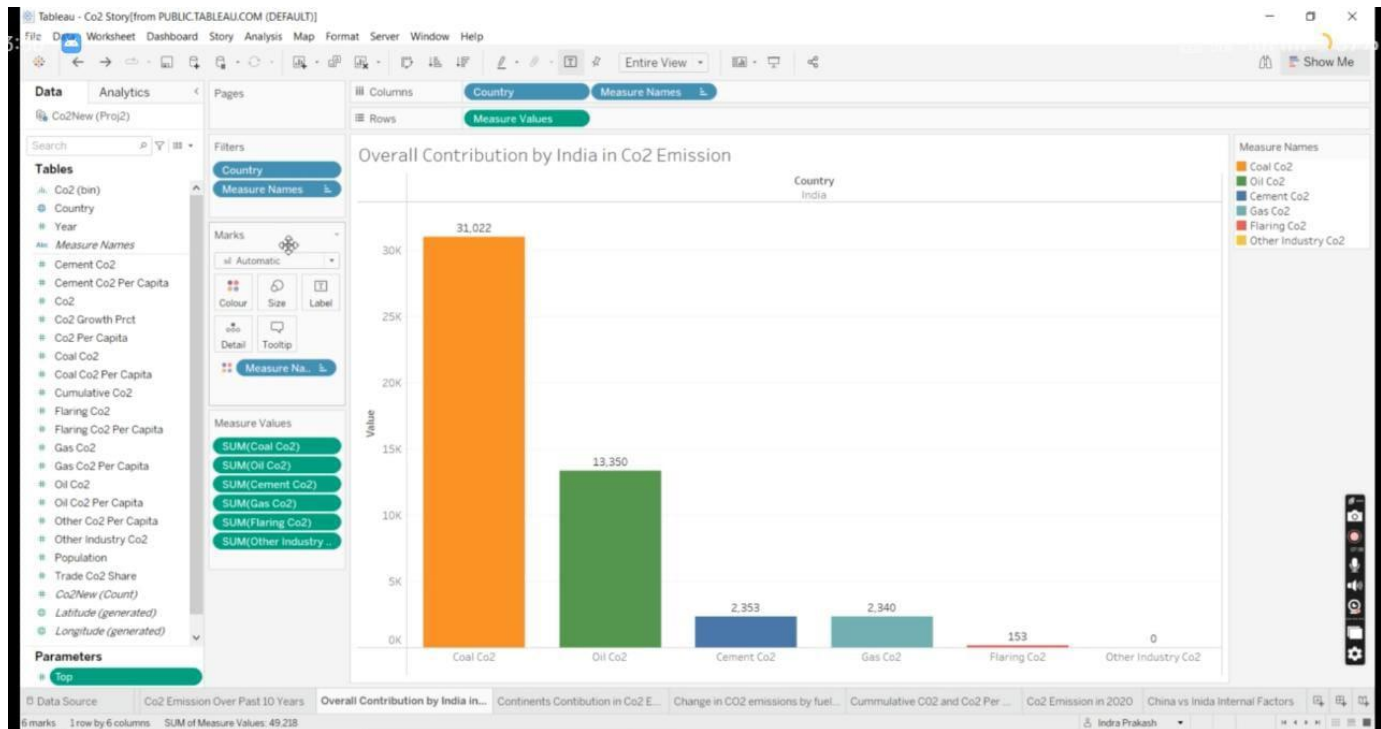**Activity1.2: To Understand- Co2 Emission per Capita, Co2 Emission by International Factors, Emission Rate Over Year.**

Activity 1.3: To Understand- Co2 contribution by different fossil fuels, Co2 Emission over past 10 Years, Change in Co2 Emission and Co2 Emission in 2020

Milestone 5: Dashboard

 A dashboard is a graphical user interface (GUI)that displays information and data in an organgized, easy-to-read format. Dashboards are often user to provide real-time monitioring and analysis of data, and are typically design for a specific purpose or use case.
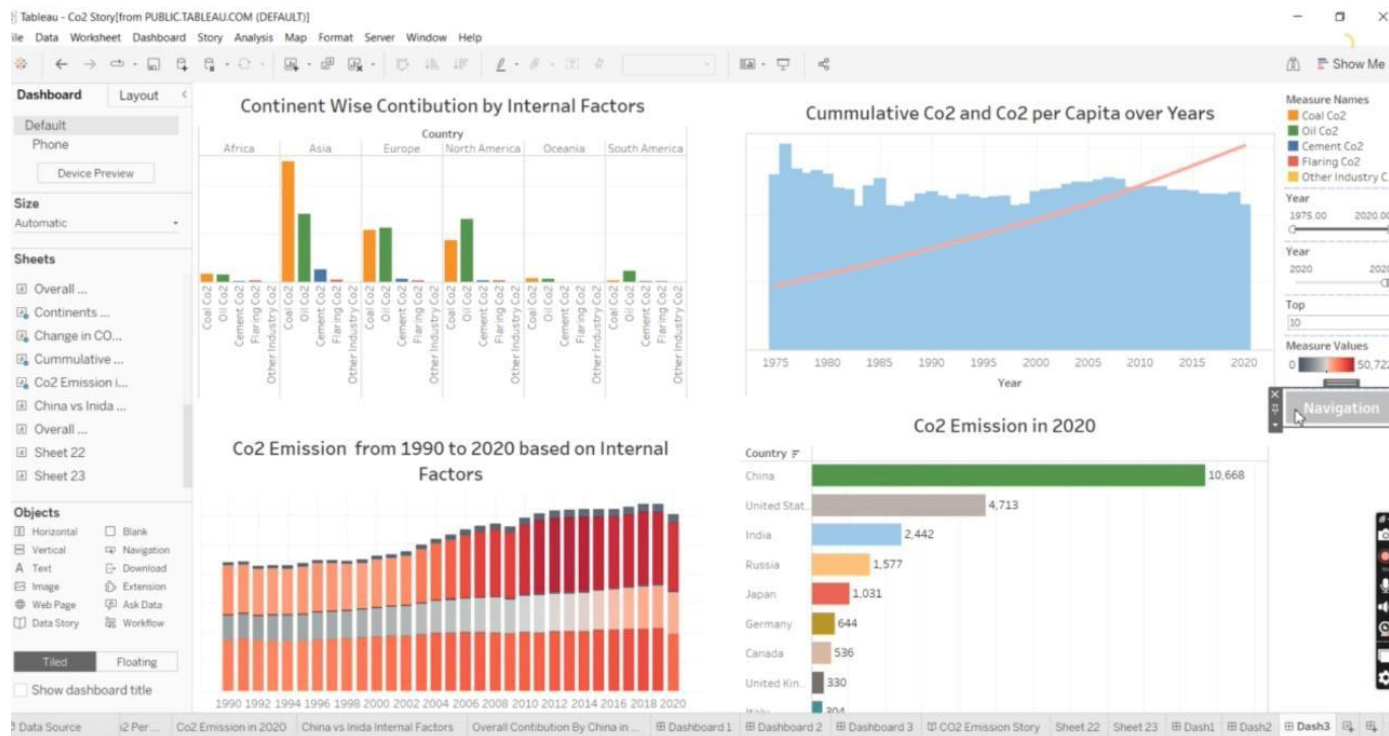
Milestone5:Dashboard

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,andaretypicallydesignedforaspecificpurposeorusecase.Dashboardscanbeusedinavarietyofsettings, such as business, finance, manufacturing, healthcare, and many other industries. They canbe used to track key performance indicators (KPIs), monitor performance metrics, and display data intheformofcharts,graphs,andtables.

Activity :1- Responsive and Design of Dashboard

Explanationvideolink: https://drive.google.com/file/d/1dMO07jzPoE-xLIuqPVe9lYK6LiqDwfAD/view?usp=drivesdk
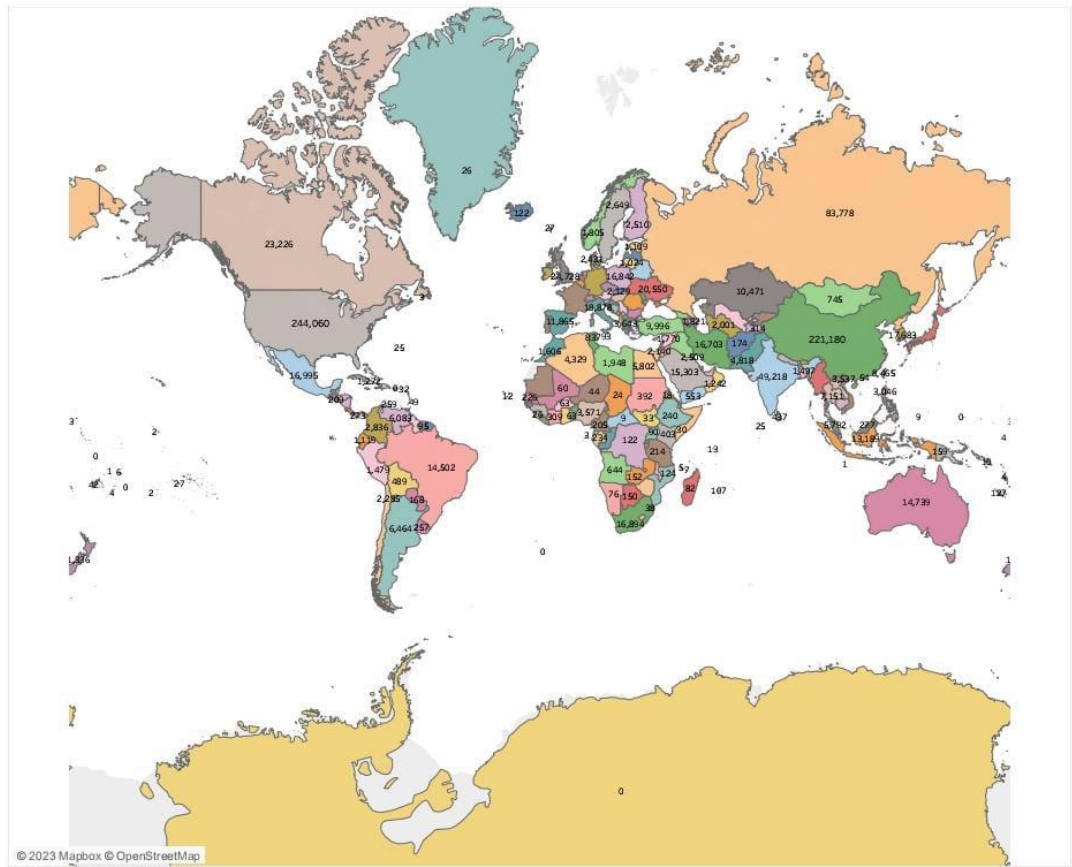
Milestone6:Story

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

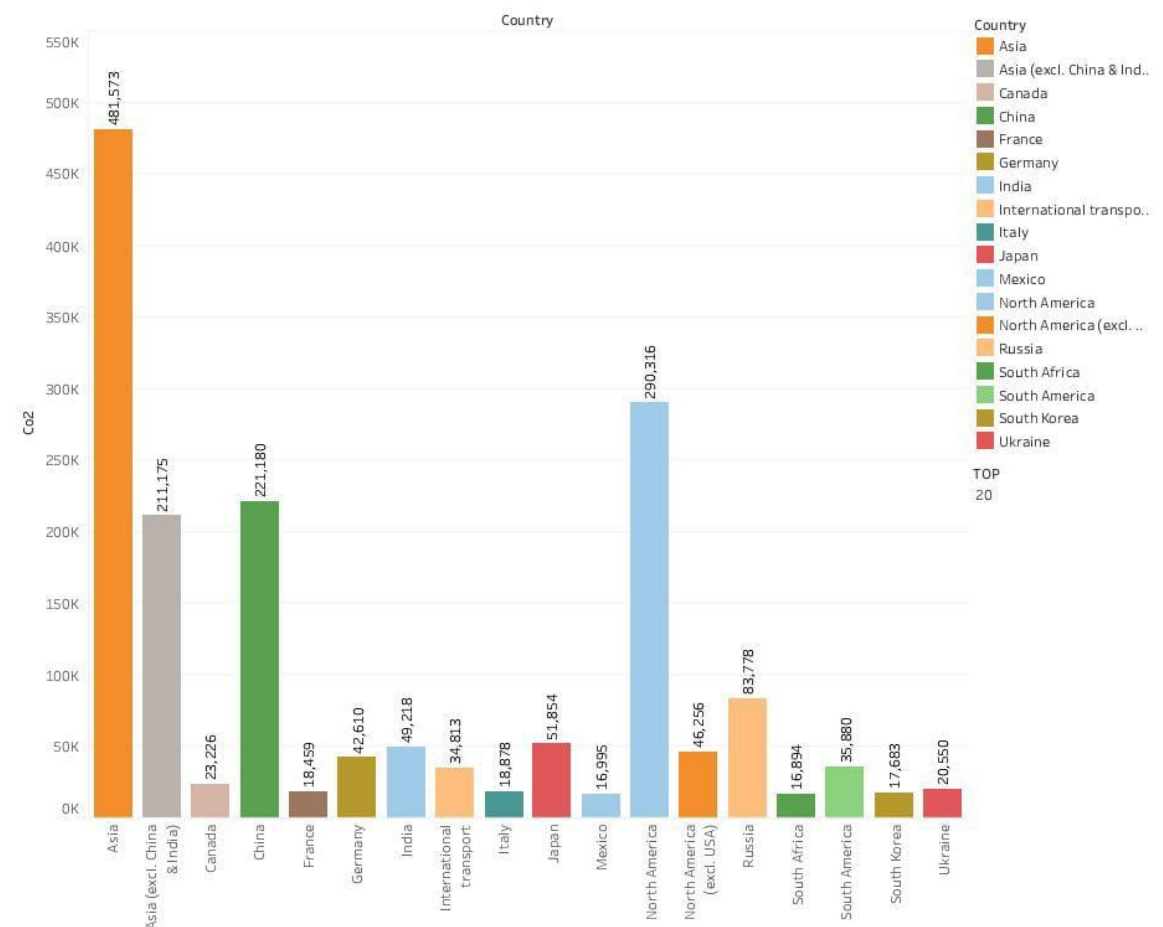## Activity:1- No of Scenes of Story

Explanationvideolink:

Story 1

| since 1751 the world has co2 emission wor.. | the top five countries that emit co2 are Asia.. | Emission have contimrd to grow repi.. | the U.S has the thirteauth higest per .. | co2 emission in 2022 provides a complete p.. | in the risualiztion we see the differeenee in.. | deforestation land clearin.. |

© 2023 Mapbox © OpenStreetMap

Story 1

Country

Co2

- 550K
- 500K
- 450K
- 400K
- 350K
- 300K
- 250K
- 200K
- 150K
- 100K
- 50K
- 0K

481,573
211,175
23,226
221,180
18,459
42,610
49,218
34,813
18,878
51,854
16,995
290,316
46,256
83,778
16,894
35,880
17,683
20,550

Asia | Asia (excl. China & India) | Canada | China | France | Germany | India | International transport | Italy | Japan | Mexico | North America | North America (excl. USA) | Russia | South Africa | South America | South Korea | Ukraine

Country
- Asia
- Asia (excl. China & Ind..
- Canada
- China
- France
- Germany
- India
- International transpo..
- Italy
- Japan
- Mexico
- North America
- North America (excl. ..
- Russia
- South Africa
- South America
- South Korea
- Ukraine

TOP
20

Milestone7:PerformanceTesting

Activity 1:Amount of Data Rendered to DB

- The amount of data that is rendered to a database depends on the size of thedatasetandthecapacityofthedatabasetostoreandretrievedata.

- Open the SQL Server Management Studio, go to the database then click to expand the tables, select the table and Right click and select Properties.
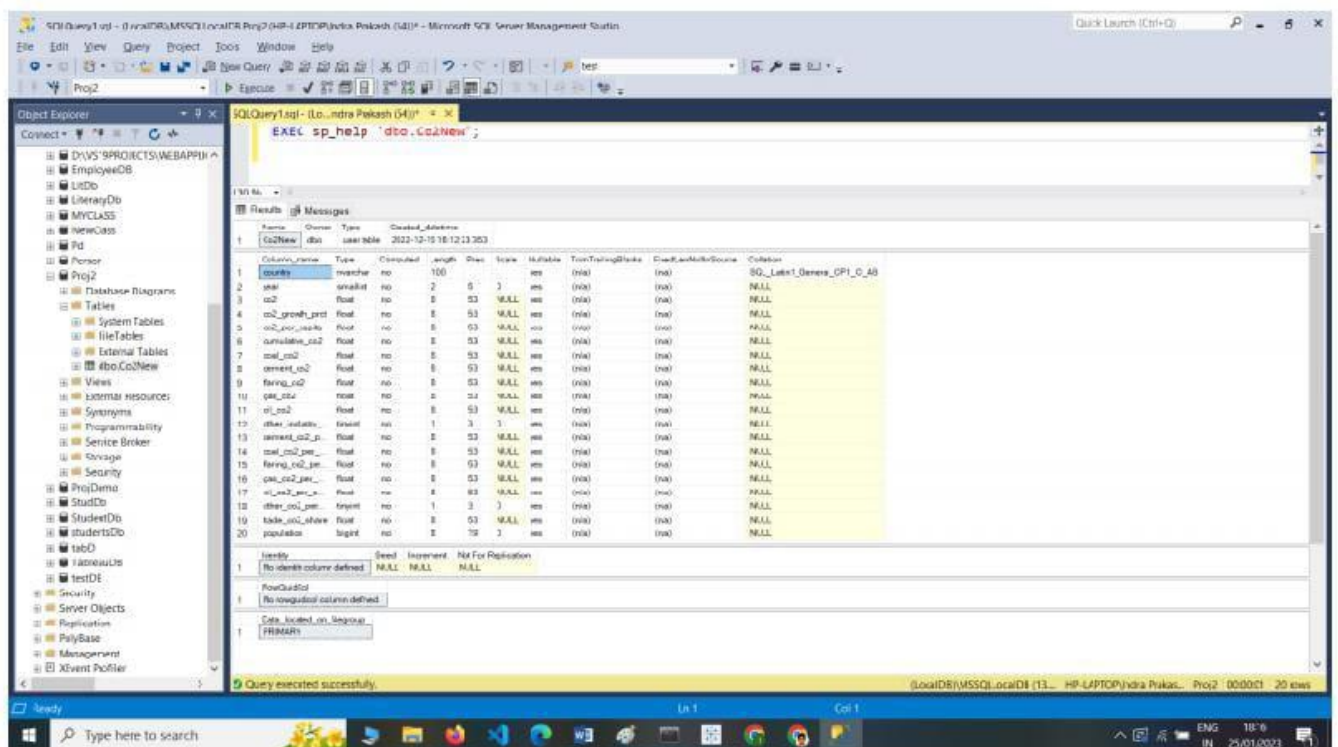
SQLQuery1.sql - (LocalDB)\MSSQLLocalDB.Proj2 (HP-LAPTOP\Indra Prakash (54))* - Microsoft SQL Server Management Studio
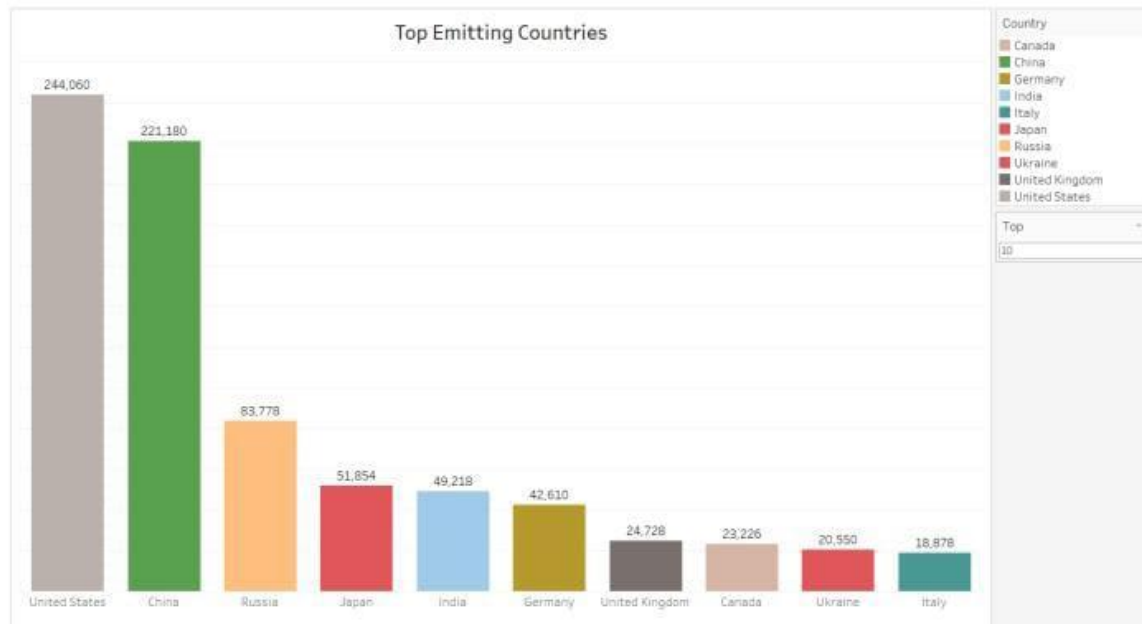
File Edit View Query Project Tools Window Help

Proj2 | Execute

SQLQuery1.sql - (Lo...Indra Prakash (54))*

```
USE Proj2 SELECT * FROM INFORMATION_SCHEMA.COLUMNS
```

Results | Messages

	TABLE_CATALOG	TABLE_SCHEMA	TABLE_NAME	COLUMN_NAME	ORDINAL_POSITION	COLUMN_DEFAULT	IS_NULLABLE	DATA_TYPE	CHARACTER_MAXIMUM_LENGTH	CHARACTER_OCTET_LENGTH	NUMERIC_PRECISION	NUMERIC_PR...
1	Proj2	dbo	Co2New	country	1	NULL	YES	nvarchar	50	100	NULL	NULL
2	Proj2	dbo	Co2New	year	2	NULL	YES	smallint	NULL	NULL	5	10
3	Proj2	dbo	Co2New	co2	3	NULL	YES	float	NULL	NULL	53	2
4	Proj2	dbo	Co2New	co2_growth_prct	4	NULL	YES	float	NULL	NULL	53	2
5	Proj2	dbo	Co2New	co2_per_capita	5	NULL	YES	float	NULL	NULL	53	2
6	Proj2	dbo	Co2New	consumtion_co2	6	NULL	YES	float	NULL	NULL	53	2
7	Proj2	dbo	Co2New	coal_co2	7	NULL	YES	float	NULL	NULL	53	2
8	Proj2	dbo	Co2New	cement_co2	8	NULL	YES	float	NULL	NULL	53	2
9	Proj2	dbo	Co2New	flaring_co2	9	NULL	YES	float	NULL	NULL	53	2
10	Proj2	dbo	Co2New	gas_co2	10	NULL	YES	float	NULL	NULL	53	2
11	Proj2	dbo	Co2New	oil_co2	11	NULL	YES	float	NULL	NULL	53	2
12	Proj2	dbo	Co2New	other_industry_co2	12	NULL	YES	tinyint	NULL	NULL	3	2
13	Proj2	dbo	Co2New	cement_co2_per_capita	13	NULL	YES	float	NULL	NULL	53	2
14	Proj2	dbo	Co2New	coal_co2_per_capita	14	NULL	YES	float	NULL	NULL	53	2
15	Proj2	dbo	Co2New	flaring_co2_per_capita	15	NULL	YES	float	NULL	NULL	53	2
16	Proj2	dbo	Co2New	gas_co2_per_capita	16	NULL	YES	float	NULL	NULL	53	2
17	Proj2	dbo	Co2New	oil_co2_per_capita	17	NULL	YES	float	NULL	NULL	53	2
18	Proj2	dbo	Co2New	other_co2_per_capita	18	NULL	YES	bigint	NULL	NULL	3	10
19	Proj2	dbo	Co2New	trade_co2_share	19	NULL	YES	float	NULL	NULL	53	2
20	Proj2	dbo	Co2New	population	20	NULL	YES	bigint	NULL	NULL	19	10

Query executed successfully. (LocalDB)\MSSQLLocalDB (13... HP-LAPTOP\Indra Prakas... Proj2 00:00:00 20 rows

Activity 2: Utilization of Data Filters

Top Emitting Countries

Country	Value
United States	244,060
China	221,180
Russia	83,778
Japan	51,854
India	49,218
Germany	42,610
United Kingdom	24,728
Canada	23,226
Ukraine	20,550
Italy	18,878

Country
- Canada
- China
- Germany
- India
- Italy
- Japan
- Russia
- Ukraine
- United Kingdom
- United States

Top

10

Activity 3: No of Calculation Fields

1. Top World Emission
2. Top Emitting Countries
3. Co2 Emission over Time
4. Co2 Emission India vs USA
5. Total Emission by Continents
6. Co2 Emission per Capita
7. Co2 Emission by International Factors
8. Emission Rate over Years
9. Donut Charts-Coal Co2,Cement Co2,Gas Co2,Oil Co2
10. Co2 Emission over past 10 years
11. Continent Contribution in Co2 Emission
12. Cumulative Co2 and Co2 per Capita
13. Co2 Emission in 2020
14. China vs India Co2 emission due to internal factors
15. Overall Contribution by China

Milestone8:Webintegration

Publishing helps us to track and monitor key performance metrics, to communicate results andprogress.helpapublisherstayinformed,makebetterdecisions,andcommunicatetheirperformancetoot hers.

Publishingdashboardandreportstotableaupublic

Step1:GotoDashboard/story,clickonsharebuttononthetopribbon

Givetheserveraddressofyourtableaupublicaccountandclickonconnect.

ExplanationVideo:-

https://drive.google.com/file/d/1T6GA7Lvlh0QXIPuUcR1TJtd66YQI7pma/view?usp=sharing

Step2: Onceyouclickonconnectitwillaskyoufortableaupublicusernameandpassword

Onceyouloginintoyourtableaupublicusingthecredentials,theparticularvisualizationwillbepublishedintotableaupublic

Note:Whilepublishingthevisualizationtothepublic,therespectivesheetwillgetpublished whenyouclickonshareoption.

Activity1: Dashboard andStory embed withUI With Flask

Explanationvideolink:

https://drive.google.com/file/d/12JmI6meo3yw_YZOP1yGpvTQshcHceEU8/view?usp=sharing

Home   About   Dashboard   Story   Visualizations   Report   Contact

Welcome to Global Co2 Emission Analysis for Year 2020

Carbon dioxide emissions are the primary driver of global climate change. It's widely recognised that to avoid the worst impacts of climate change, the world needs to urgently reduce emissions.

Get Started

What to Know About CO2 Emissions

A naturally occurring gas

Today, 30 billion tons per year of CO2 (or 84%) is related to human activity

Humans started emitting CO2 during the Industrial Revolution

Human activity includes but not limited to transportation and electricity

CO2 drives climate crisis and also affects the oceans, making them 30% more acidic

Treehugger

ABOUT US

Home   About   Dashboard   Story   Visualizations   Report   Contact

REPORT

Top Co2 Emitting countries for Past 10 Years

China is the highest Co2 Emiting country among the other countries.

United States is the second highest Co2 Emiting country.

India is the Third highest Co2 Emiting country.

Continents Contribution towards Co2 Emission

Asian is the highest Co2 Emiting country among the other continents.

Europe is the second highest Co2 Emiting continent.

Antartica is the lowest Co2 Emiting countries because of low human-activity/existence in the continent.

Overall India Contribution towards Co2 Emission

Coal is the highest factor of Co2 Emission.
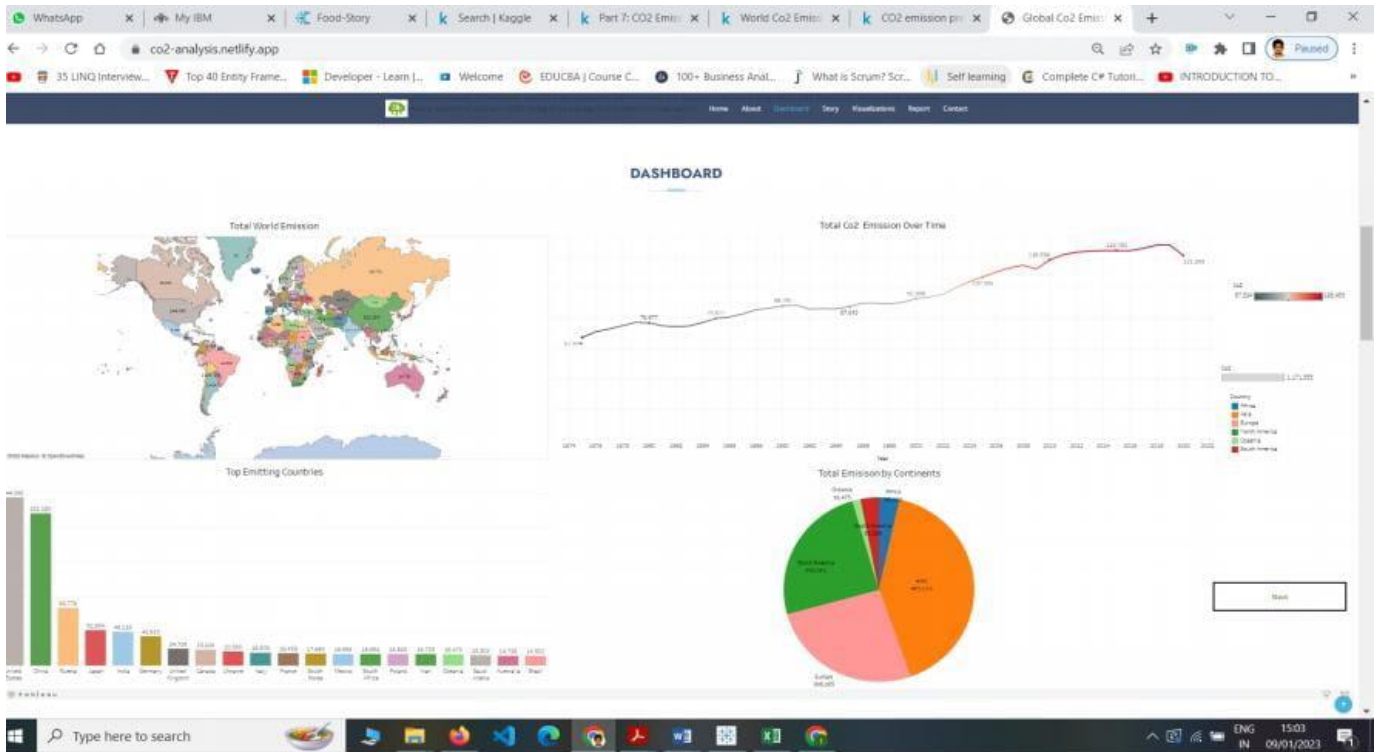
Milestone9:ProjectDemonstration&Documentation

Activity1:- Recordexplanation Videofor projectend toend solution

Here is the link for our record explanation video for our project:

https://drive.google.com/file/d/1dMO07jzPoExLIuqPVe9IYK6LiqDwfAD/view?usp=drivesdk

Activity 2:- Project Documentation-Step by step project development procedure

https://github.com/karthikTeam/karthikTeam/commit/d4e705079ae63 4d939ce0e5faea2ca9f3b5e000a