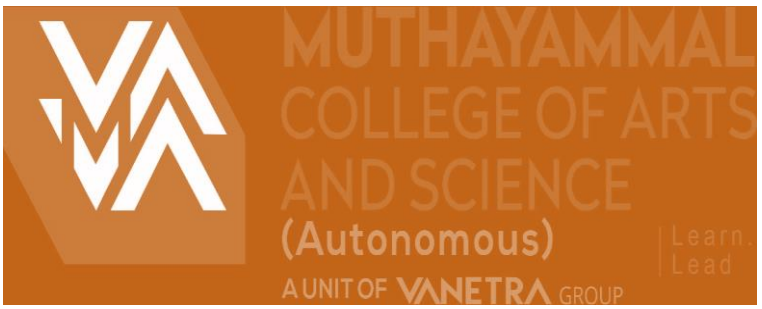
MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE ,RASIPURAM



“visualization Tool for Electric Vehical Charge And Range Analysis”

Guided by-Shivani

Our Team,

Team leader: RANJITHA.K(20UEL1067)

Team members: KOWSALYA.A(20UEL1066)

SELVAKUMAR.S(20UEL1063)

“VISUALATION TOOL FOR ELECTRIC VEHICAL CHARGE AND RANGE ANALYSIS”-PROJECT REPORT

Visualization Tool for Electric Vehicle Charge and Range

Analysis

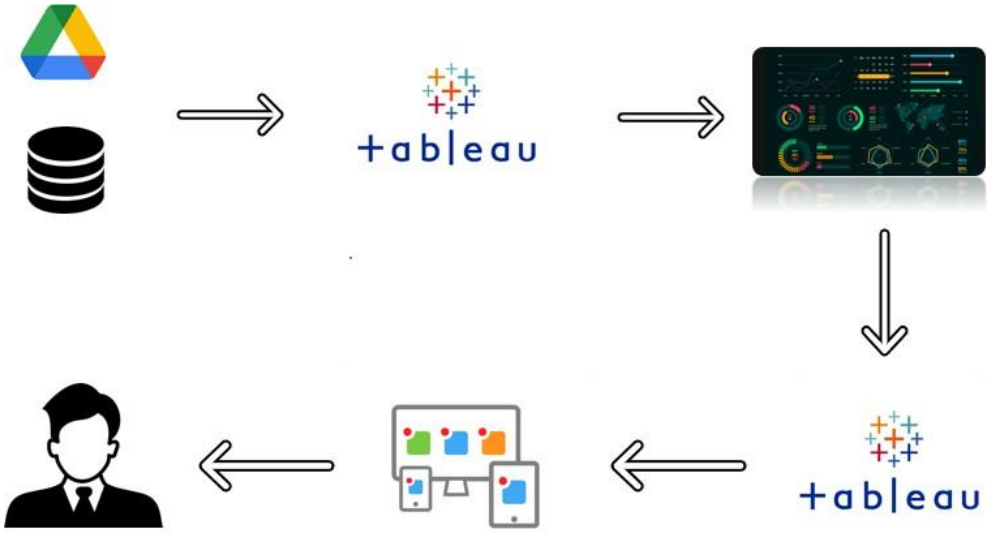
Project Description

A vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source and have an electric motor instead of an internal combustion engine.

The Electric Vehicle (EV) is not new, but it has been receiving significantly more attention in recent years. Advances in both EV analytics and battery technologies have led to increased automotive market share. However, this growth is not attributed to hardware alone. The modern mechatronic vehicle marries electrical storage and propulsion systems with electronic sensors, controls, and actuators, integrated closely with software, secure data transfer, and data analysis, to form a comprehensive transportation solution. Advances in all these areas have contributed to the overall rise of EV's, but the common thread that runs through all these elements is data analytics.

The new EV's are combined Electrical storage and propulsion systems with electronic sensors, controls, and actuators, integrated closely with software, secure data transfer to form a comprehensive transportation solution.

Technical Architecture



Project Flow

To accomplish this, we have to complete all the activities listed below,

- Define Problem / Problem Understanding
  - Specify the business problem
  - Business requirements
  - Literature Survey
  - Social or Business Impact.
- Data Collection & Extraction from Database
  - Collect the dataset,
  - Storing Data in DB
  - Perform SQL Operations
  - Connect DB with Tableau
- Data Preparation
  - Prepare the Data for Visualization
- Data Visualizations
  - No of Unique Visualizations
- Dashboard
  - Responsive and Design of Dashboard
- Story
  - No of Scenes of Story
- Performance Testing
  - Amount of Data Rendered to DB ‘
  - Utilization of Data Filters
  - No of Calculation Fields
  - No of Visualizations/ Graphs
- Web Integration
  - Dashboard and Story embed with UI With Flask
- Project Demonstration & Documentation
  - Record explanation Video for project end to end solution
  - Project Documentation-Step by step project development procedure

Milestone 1: Define Problem / Problem Understanding

Activity 1: Specify the business problem

A vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source and have an electric motor instead of an internal combustion engine.

The Electric Vehicle (EV) is not new, but it has been receiving significantly more attention in recent years. Advances in both EV analytics and battery technologies have led to increased automotive market share. However, this growth is not attributed to hardware alone. The modern mechatronic vehicle marries electrical storage and propulsion systems with electronic sensors, controls, and actuators, integrated closely with software, secure data transfer, and data analysis, to form a comprehensive transportation solution. Advances in all these areas have contributed to the overall rise of EV's, but the common thread that runs through all these elements is data analytics.

The new EV's are combined Electrical storage and propulsion systems with electronic sensors, controls, and actuators, integrated closely with software, secure data transfer to form a comprehensive transportation solution.

Activity 2: Business requirements

Pure EVs, have zero tailpipe emissions.which reduces the air Pollution .since,the electric motor of EV operating on a closed circuit,it doesnot emit any harm ful gases.one of the main advantage of electrical vehicals are there lower operating cost compared to traditional vehicals, .
Additionaly it requires less Maintanance and here now a days all ev brands are giving warenty to there batteries upto 8-10 years, this the great thing that we can use that battery long time also.

The business requirements for analyzing the performance and efficiency of Electric cars include identifying KPIs, comparing performance across different parameters and brands also, identifying patterns and trends over time, identifying affecting factors, creating interactive dashboards and reports, identifying areas for improvement, making data-driven decisions, comparing to industry average and creating forecasting models for future performance. The ultimate goal is to gain insights and improve performance through data visualization techniques.

Activity 3: Literature Survey (Student Will Write)

Here in literate survey . It would aim to identify key performance indicators (KPIs) and metrics that are commonly used to measure hotel performance and efficiency, as well as any best practices or strategies that have been identified for improving performance.The literature survey would also explore any existing research on electric vehicles specifically, and would aim to identify any unique challenges or opportunities that the electric vehicles faces in terms of performance and efficiency
.The literature survey would also explore any existing research on electric vehicles , and would aim to identify any unique challenges or opportunities that the electric vehicles faces in terms of performance and efficiency

Activity 4: Social or Business Impact.

This the new technology that we can use EV cars in easily ,that we know the EV cars are now a days trending thing. Petrol and Diesels cannot remain as a only choice .even If a EV running out of a battery then still it only took 25 minutes only to charge upto 80% .and also we can charge them in our home also, these are some famous ternds that EV are highlited by this things

Social Impact: By solving or helping to solve the biggest issue in EV market. More people will understand and but the EV instead of ICE's.

Milestone 2: Data Collection & Extraction from Database

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.

Activity 1: Collect the dataset

Please use the link to download the dataset: Link

Activity 1.1: Understand the data

Data contains all the meta information regarding the columns described in the CSV files. we have provided 4 CSV files:

1. EVIndia
2. Electric_vehicle_charging_station_list
3. ElectricCarData_Clean
4. Cheapestelectriccars-EVDatabase

Column Description for EVIndia:

1. Car - Car Brand name and model
2. Style Range - Style range of car
3. Transmission- Transmission type
4. VehicleType – Type of vehicle
5. PriceRange(Lakhs) - Price Range in Lakhs
6. Capacity - Capacity of car
7. BootSpace – Bootspace of the car
8. BaseModel – Base model name
9. TopModel – Top model name

Column Description for Electric_vehicle_charging_station_list:

1. region: This column represents the region of the charging station.
2. address: This column represents the address of the charging station.
3. aux address: This column represents the auxiliary address of the charging station.
4. latitude: This column represents the latitude of the charging station.
5. longitude: This column represents the longitude of the charging station
6. type: This column represents the type of the charging station.
7. power: This column represents the power of the charging station.
8. service: This column represents the type of service at the charging station.

Column Description for ElectricCarData_Clean:

1. Brand
2. Model
3. AccelSec
4. TopSpeed_KmH
5. Range_Km
6. Efficiency_WhKm
7. FastCharge_KmH
8. RapidCharge
9. PowerTrain
10. PlugType
11. BodyStyle
12. Segment

13. Seats
14. PriceEuro

Column Description for Cheapestelectriccars-EVDatabase:

1. Name
2. Subtitle
3. Acceleration
4. TopSpeed
5. Range
6. Efficiency
7. FastChargeSpeed
8. Drive
9. NumberofSeats
10. PriceinGermany
11. PriceinUK

Activity 2: Storing Data in DB & Perform SQL Operations

Explanation video link: Database creation

Explanation video link: Basic SQL Operations

Activity 3: Connect DB with Tableau

Explanation video link: Database connection

Milestone 3: Data Preparation

Activity 1: Prepare the Data for Visualization

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into the performance and efficiency.

Explanation video link:

https://drive.google.com/file/d/1lAMzG-Cut2uKqrYv7Z1gHtBJZ7XtM1YT/view?usp=share_link

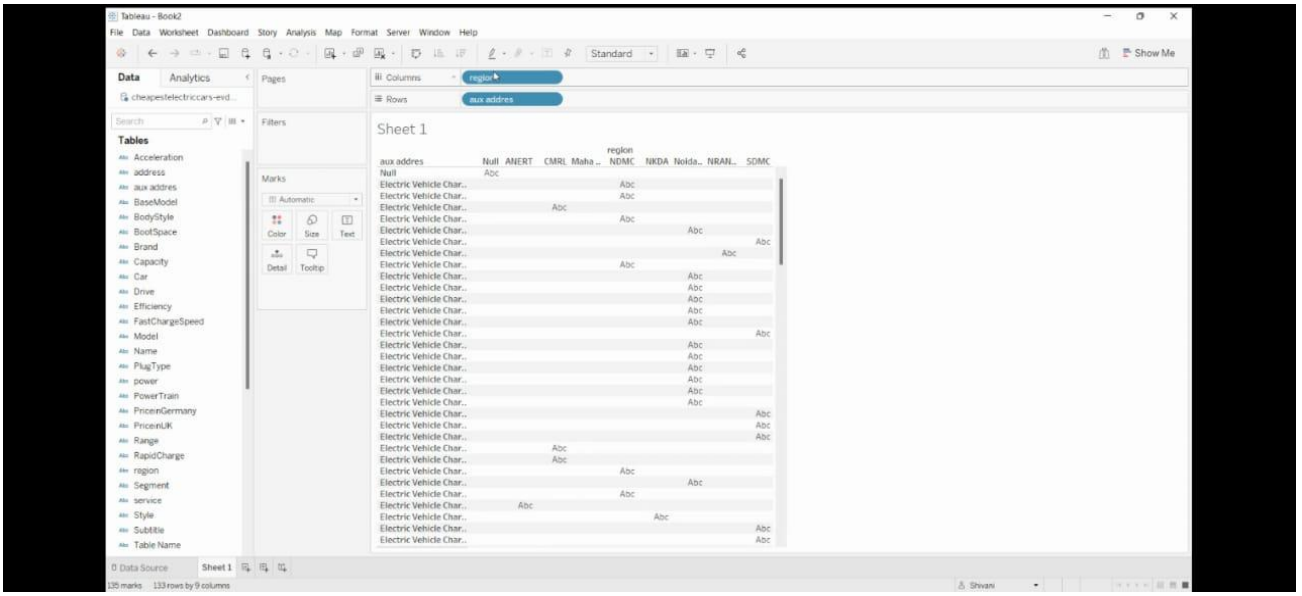
Milestone 4: Data Visualization

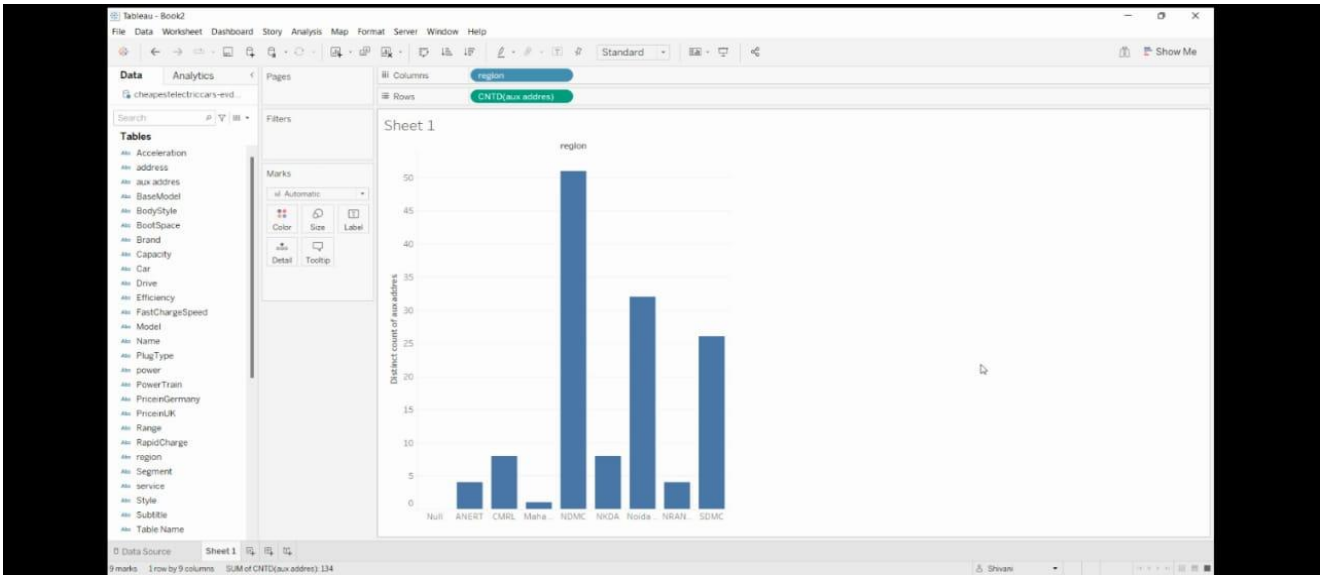
Data visualization is the process of creating graphical representations of data in order to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs,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

Activity 1: No of Unique Visualizations

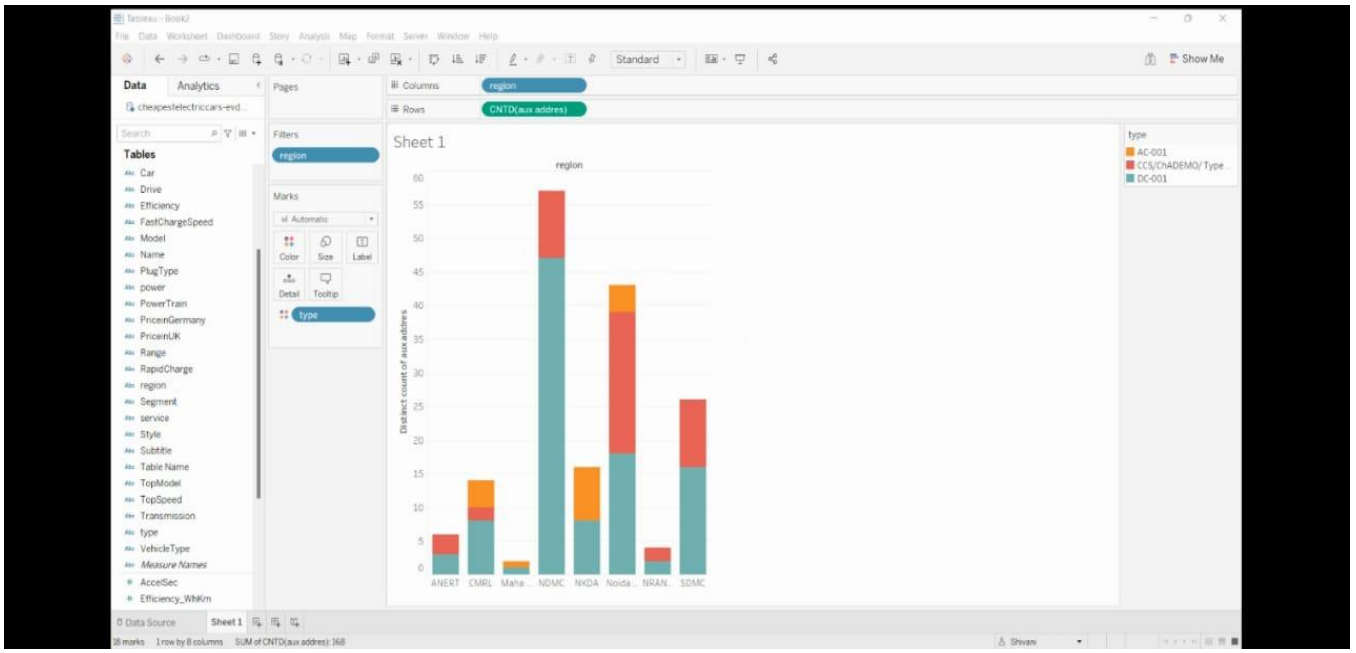
Activity 1.1: Charging Stations by region and type in India

CHARGING STATIONS: charging stations by region and type of charging station needs 3 coloums.that is Region,Aux address,Type.drag and drop the region into coloums ,aux address into Rows.



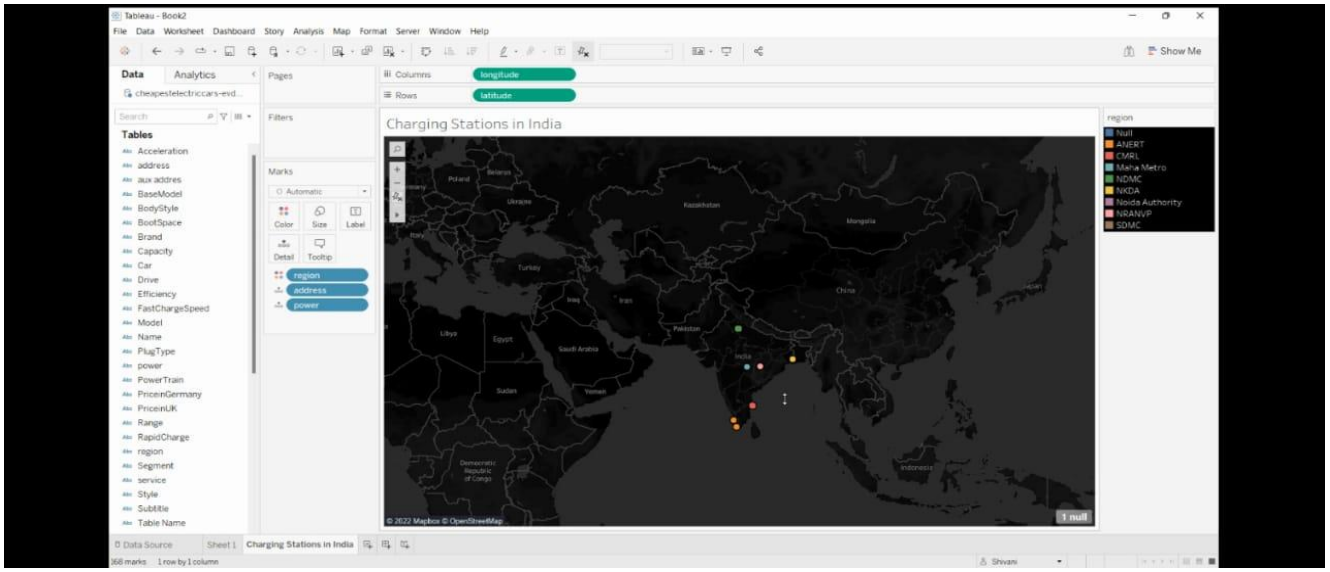


Here in aux address right click rows(aux address) click measure and again click count.



Here give the types in to colours to enhance or differentiate the visualization.

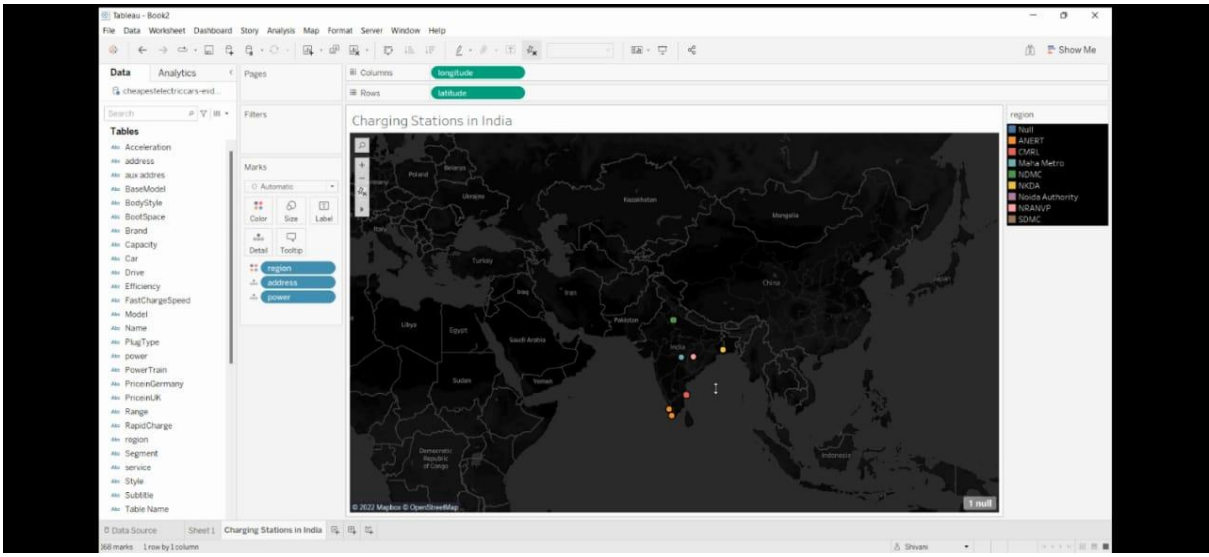
Activity 1.2: EV Charging stations map of IndiaExplanation video link:here

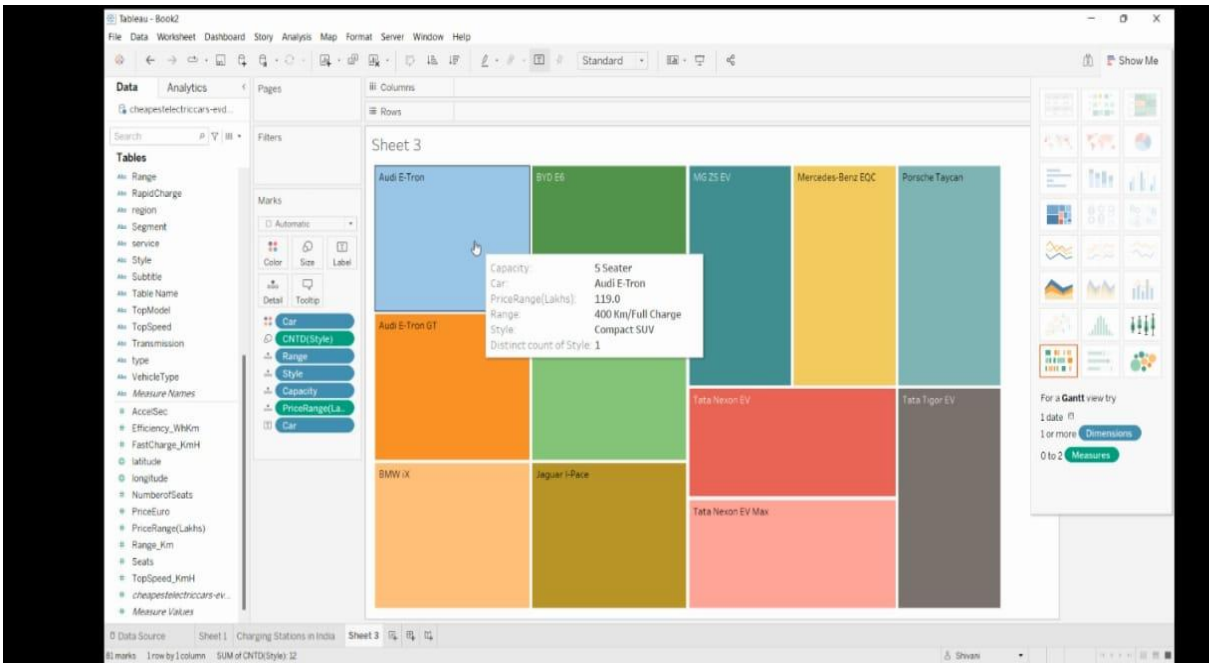


we need to plot charging stations of different regions on the map.we have to drag and drop the longtitude into colums and latitude into rows.Right Click on the Drop down of the latitude select for dimension. Drag and Drop the region into colours,for different region we have different colours.Drag and drop the power into Details.

Activity 1.3: Different EV cars in India

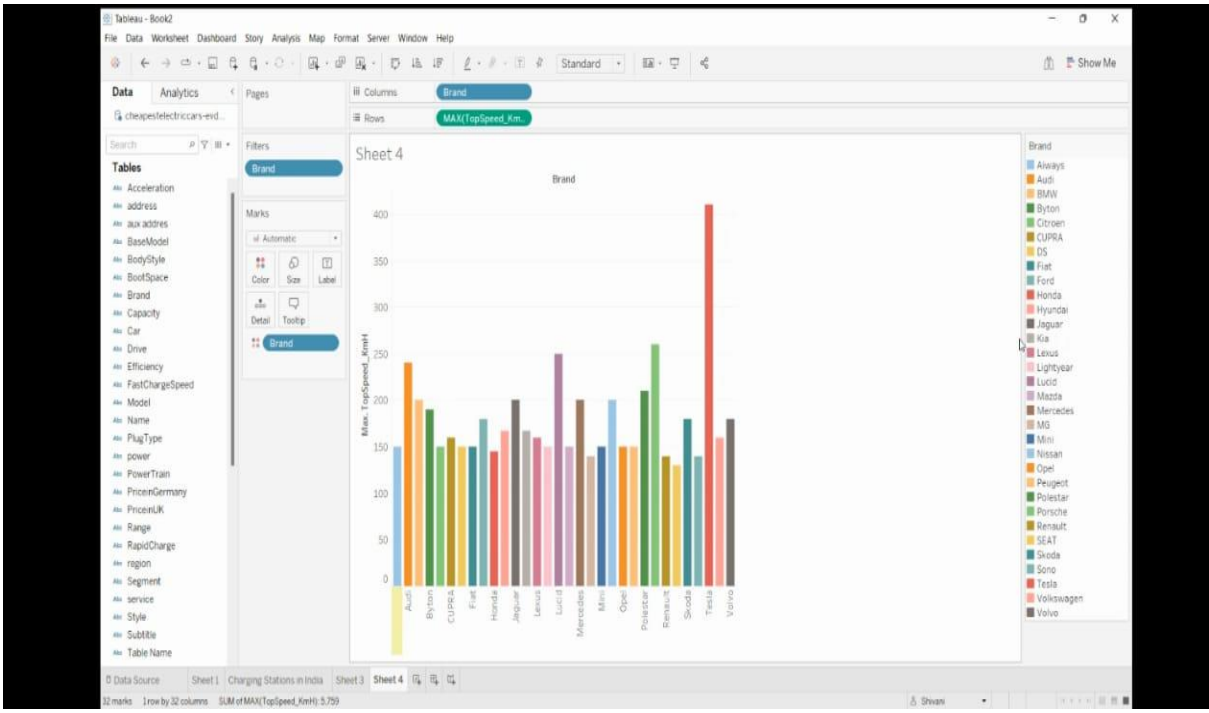
Visualization for different ev cars in india.now we have to creat the new worksheet,I am just drag and drop the Car into Text ,and I will drop the car into colour,





Here I just drag and drop the Range,style,Capacity,,into Details.here is the tree map that shows different cars in india.

Activity 1.4: Top speed for different Brands

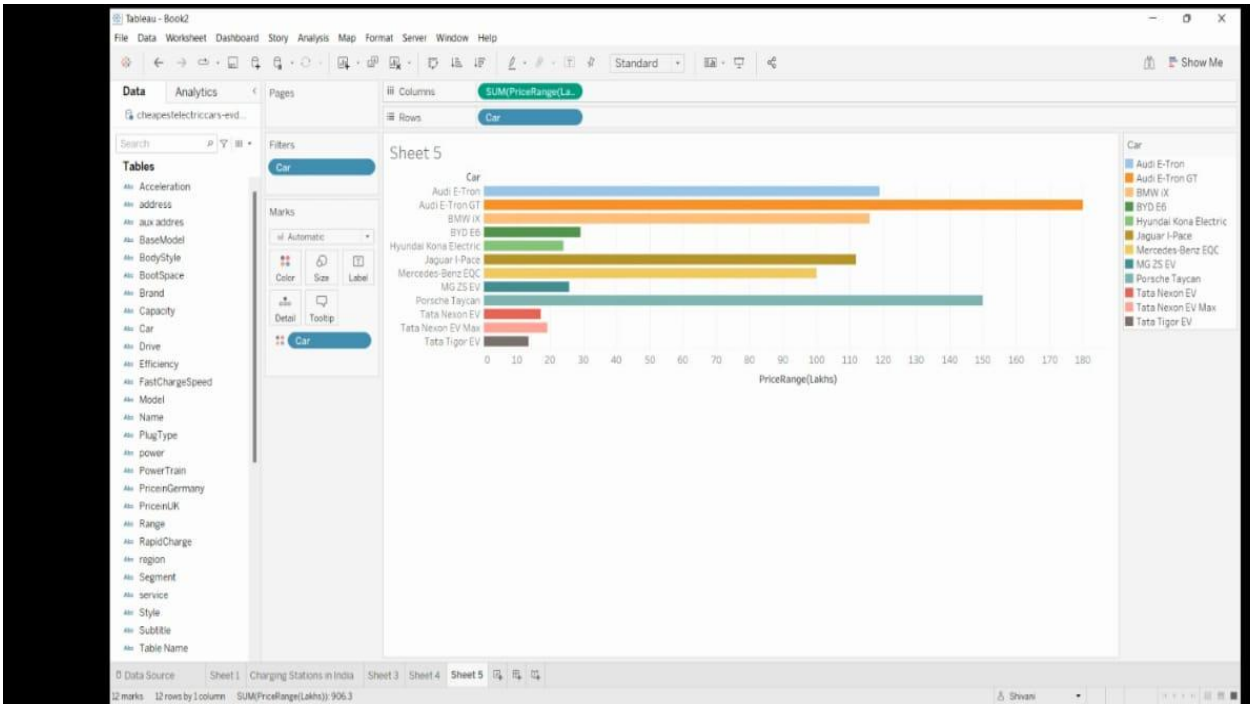


Explanation : so that we have to know different speed of different brand cars,The highest speed

shown in map is Tesla.just Drag and Drop the Brand into colums and Speed into Rows.then Drag and Drop the Brand into colours to differentiate the Brands.

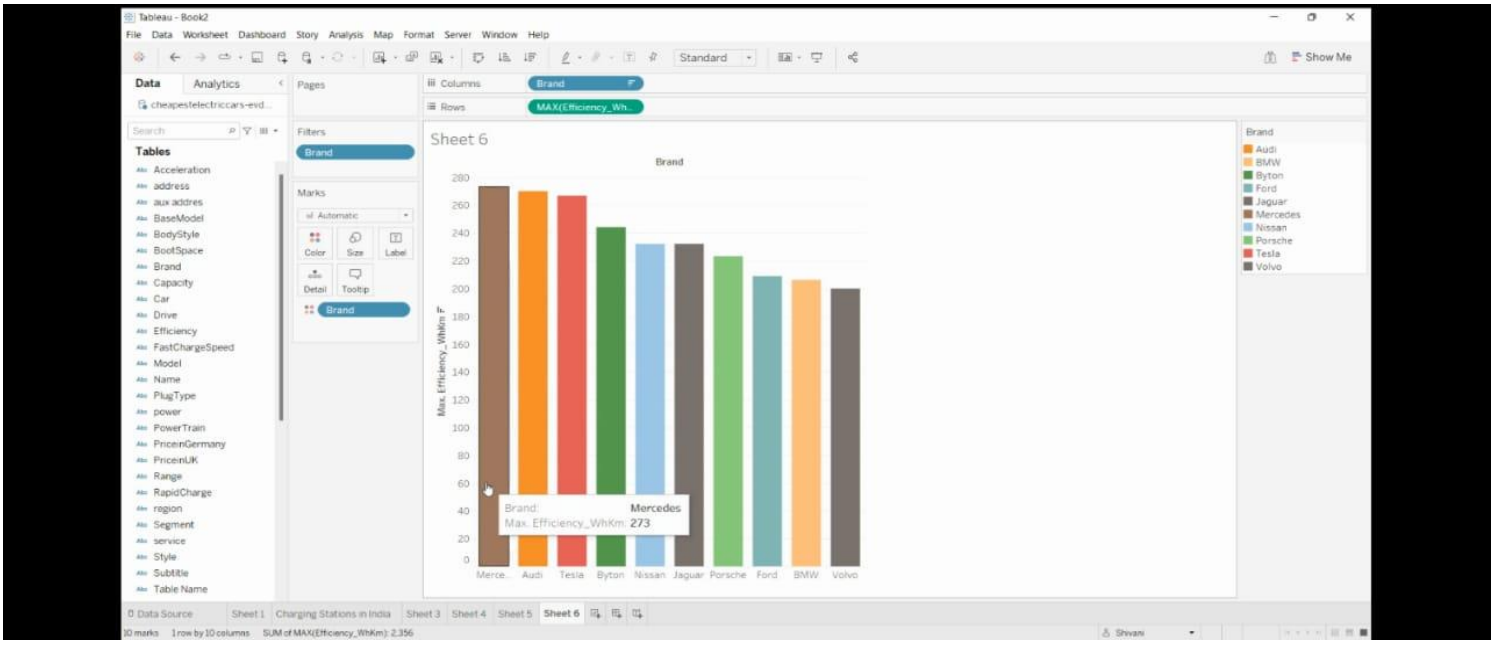
Activity 1.5: Price for different cars in India

Explanation: Now I Need The Price Range In colums,Car into Rows. Car into colours also.



Activity 1.6: Top 10 most efficient EV Brands

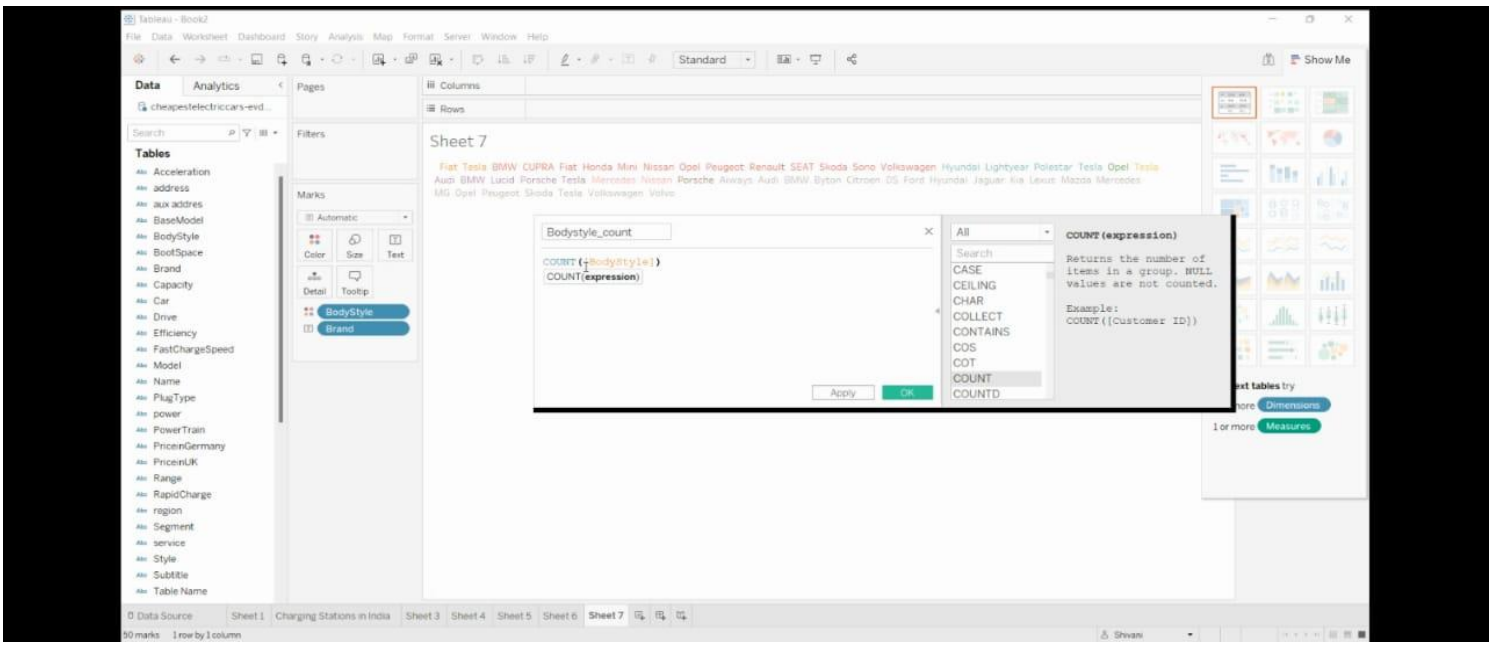
Explanation video link: here we need to Drag and Drop the Brands into colums ,efficiency into Rows.put Brands into colours to differentiate



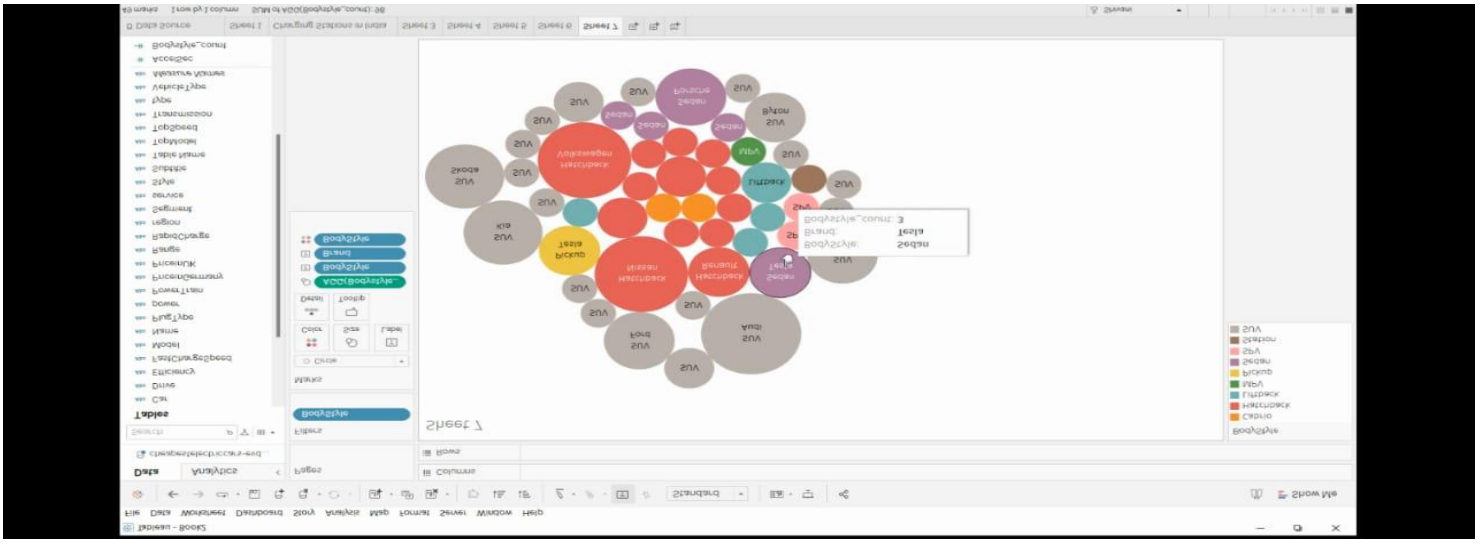
the brands ,the most efficient EV brand is

Mercedes.

Activity 1.7: Brands according to Bodystyle

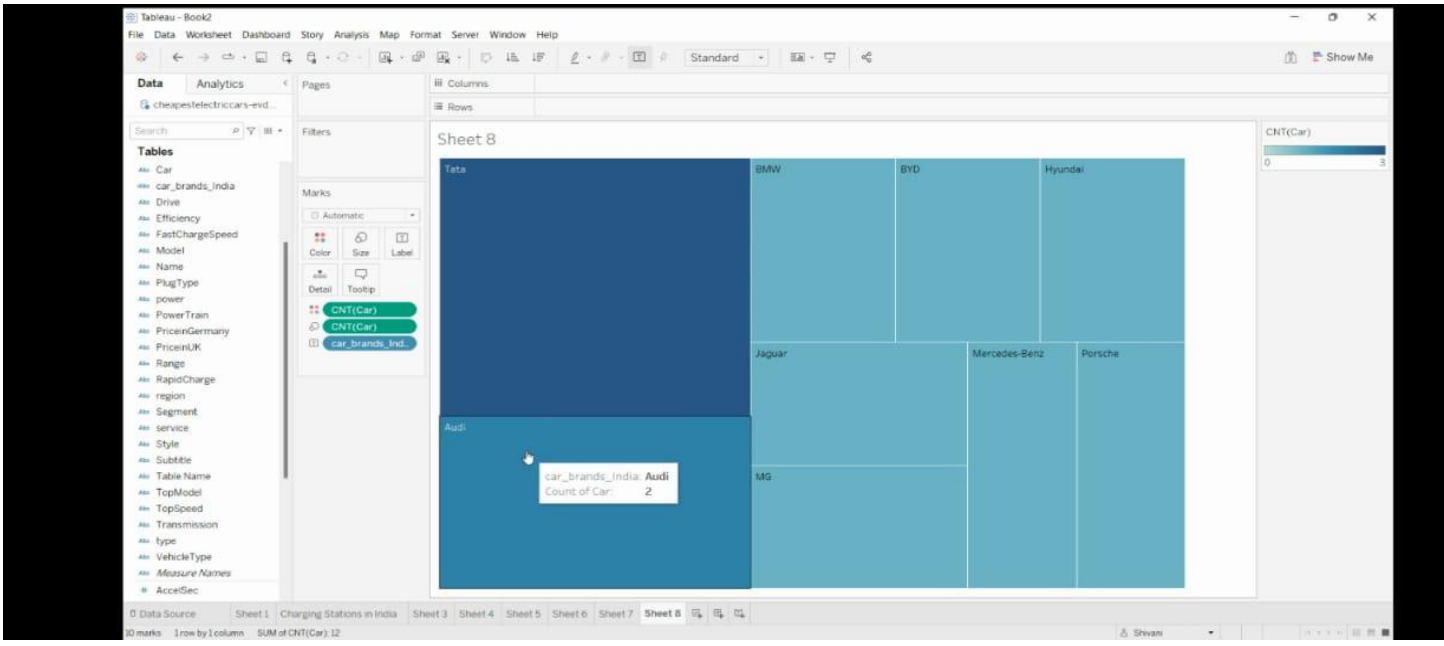


Here we need brand and count of bodystyle.Just Drag and Drop the Brand into Text,Body style into colours.before that we need to set the Calculated fields as a Body style. Select the bubble chart in show me.the here we can see the brands according to the bodystyle is ready



Activity 1.8: Brand filtered by PowerTrain type

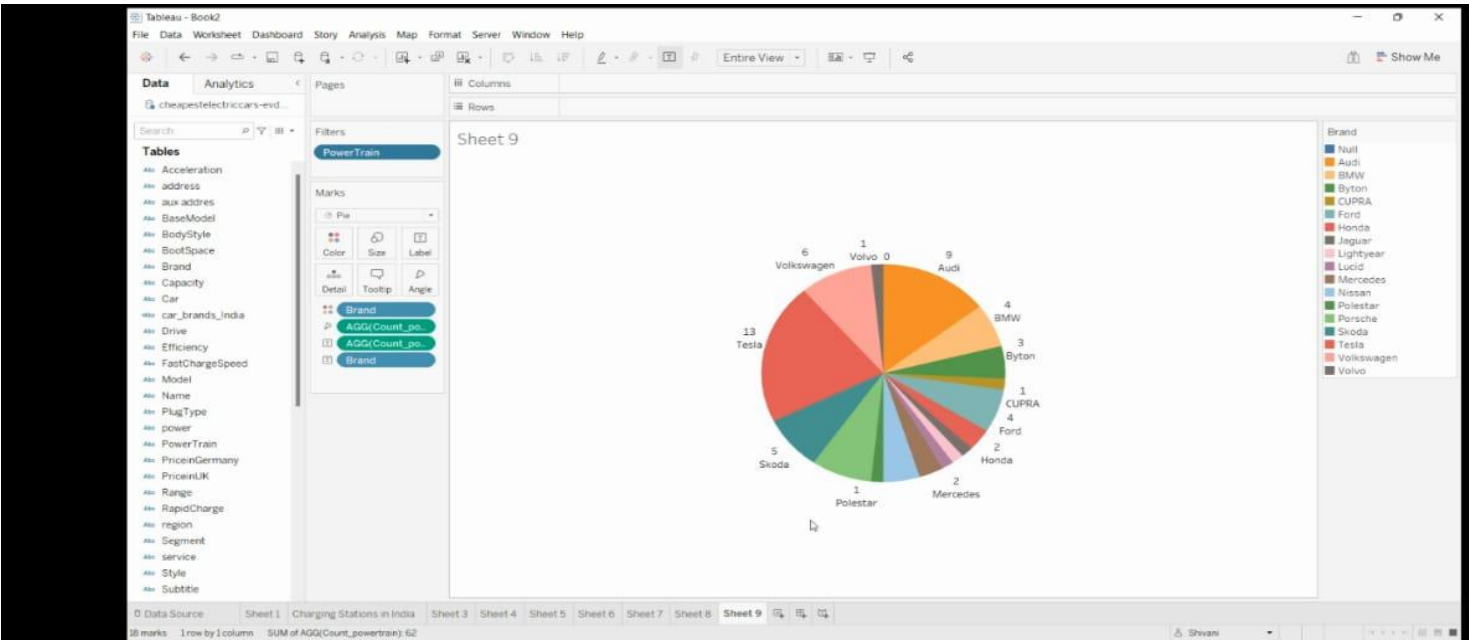
Explanation :how many models are there in



carbrands ,create caluculated fields,car_brands in india.drag and Drop the car brands into text,car into size,and cars into colours.

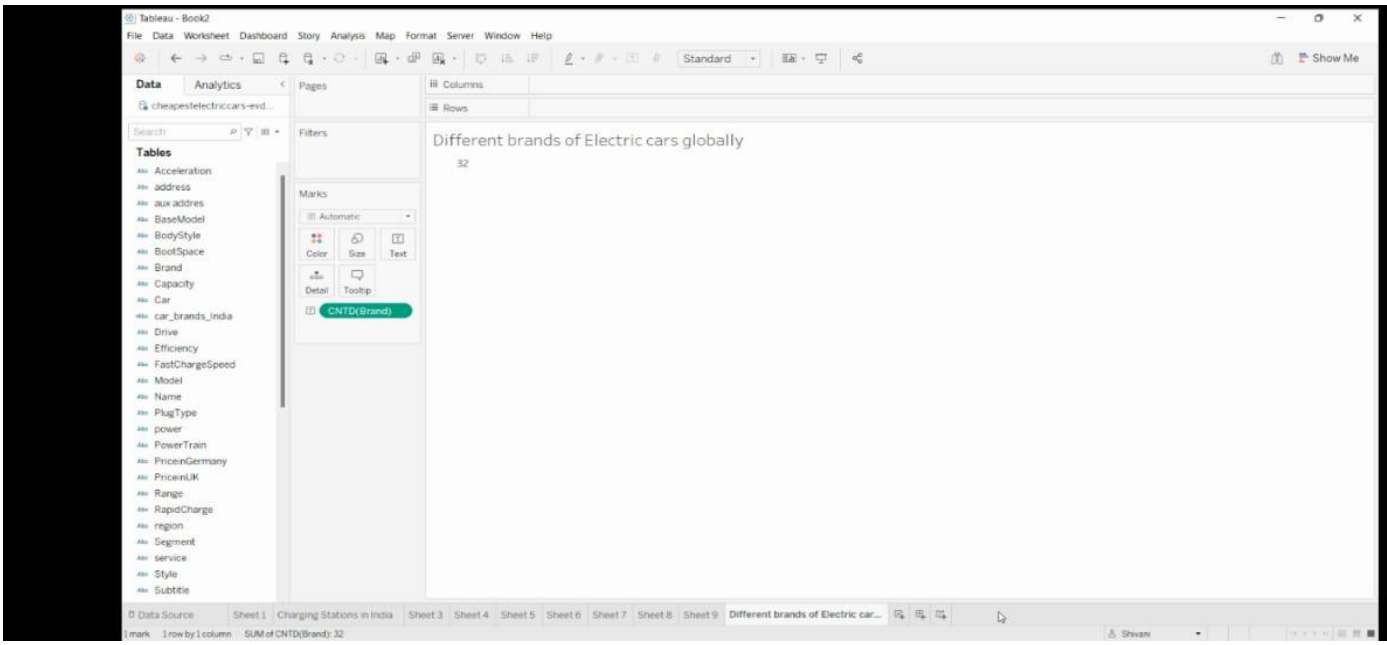
Activity 1.9: No of models by each brand

Explanation :Brand filtered by power train type create the calclulated fields,as count_powertrain.



Activity 1.10: Summary card for Different brands of EV Cars globally

Explanation :how many types of Ev cars are available globally ,just Drag and Dorp the Brands into text.in brand click measure in measure click count.

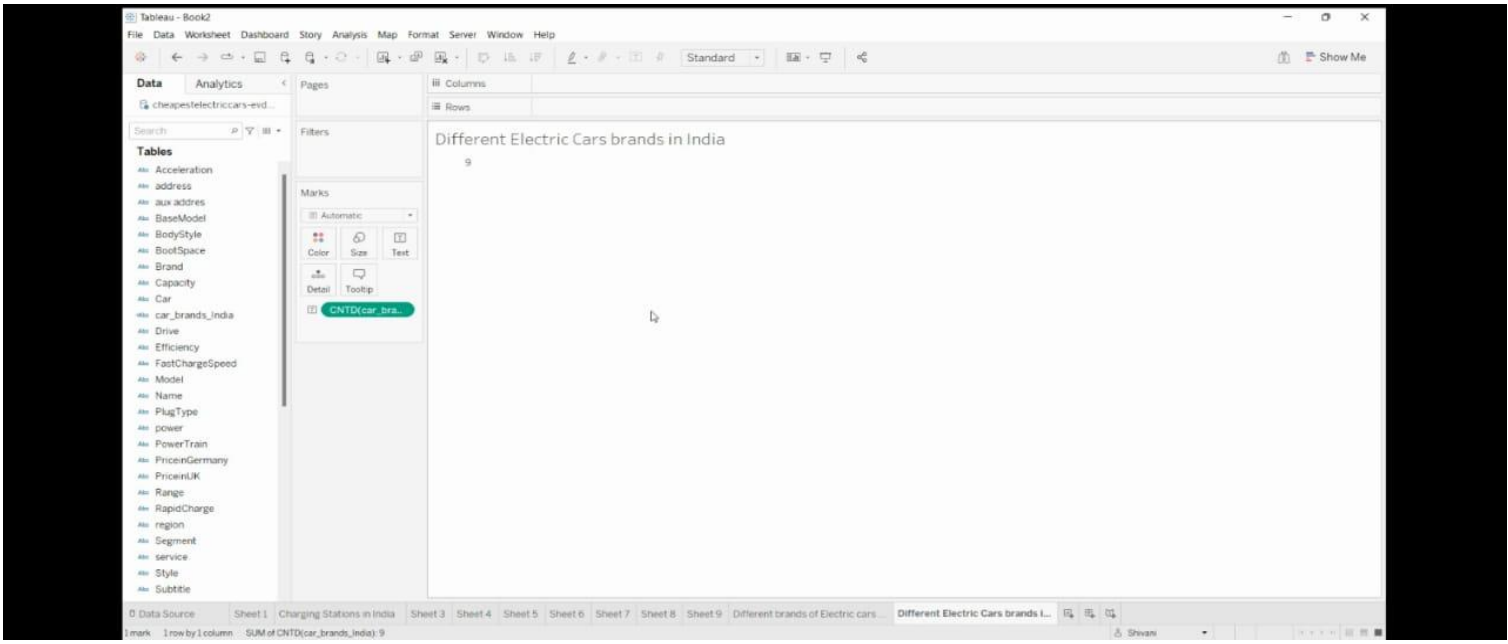


There are different brands of EV cars globaly is 32.

Activity 1.11: Summary card for Different brands of EV Cars in India

Explanation : Now create the another summary chart, I just Drag and drop the car_brand_india into text, go to the drop down icon click measure there click count.

In this Visualization the different brands of ev cars in india and in india there are totally 9 evs are available.



Milestone 5: Dashboard

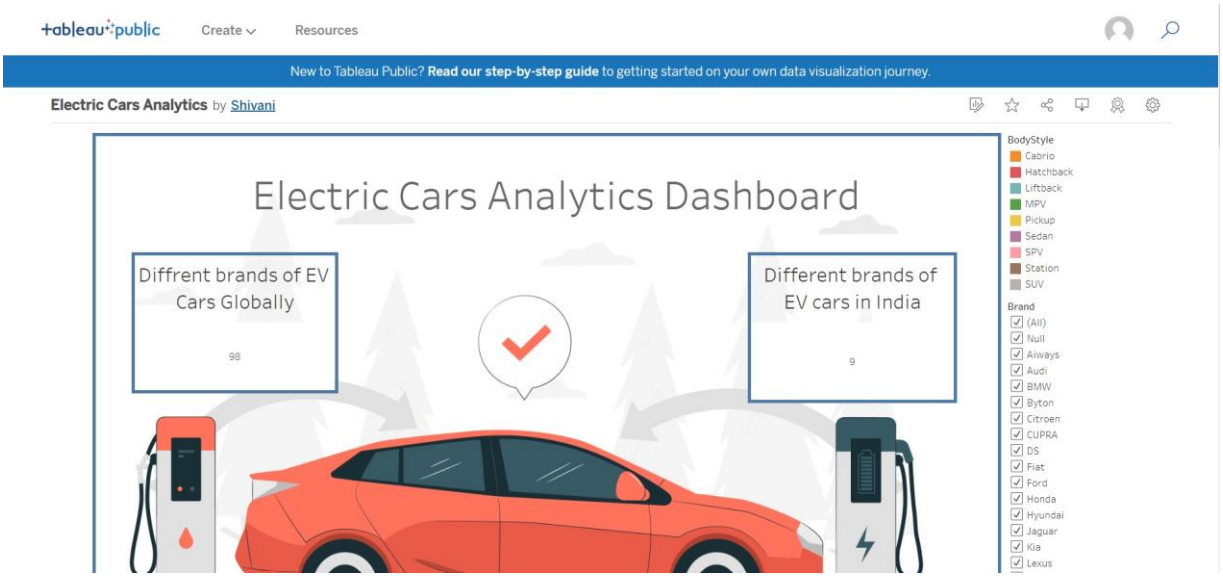
A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data, and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of 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.

Activity :1- Responsive and Design of Dashboard

Once you have created views on different sheets in Tableau, you can pull them into a dashboard.

Explanation video link:

https://drive.google.com/file/d/1R-WWO932vyqfBuGuhOsFLyfAlbbf6p_8/view?usp=share_link



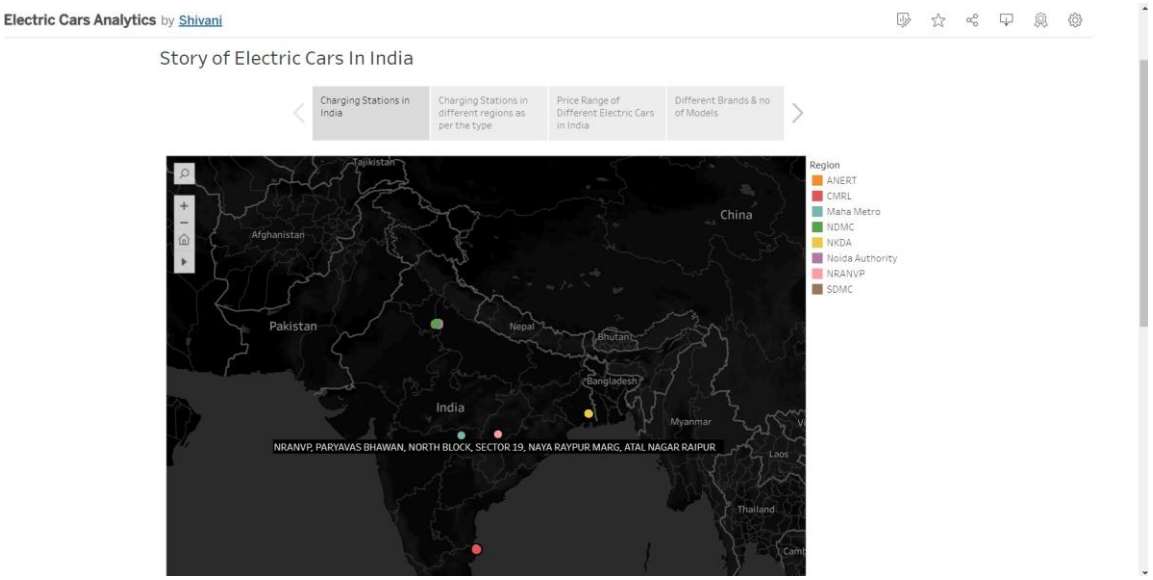
Milestone 6: Story

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.

Activity:1- No of Scenes of Story

Explanation video link:

https://drive.google.com/file/d/1BIm4nlyGNqrclyIN-PZ27-g0VUIVptCN/view?usp=share_link

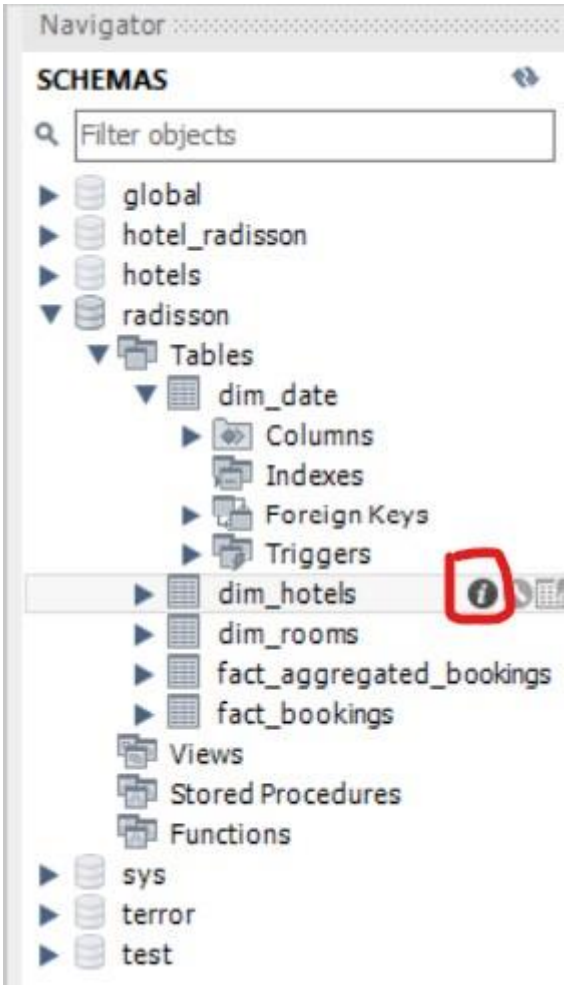


Milestone 7: Performance Testing

Activity 1: Amount of Data Rendered to DB

- The amount of data that is rendered to a database depends on the size of the dataset and the capacity of the database to store and retrieve data.

- Open the MySQL Workbench, go to the database then click to expand the tables,select the table and click on (i) button to get the information related to table such as column count,table rows etc.


Navigator
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Filter objects
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hotels
radisson
Tables
dim_date
Columns
Indexes
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Triggers
dim_hotels
dim_rooms
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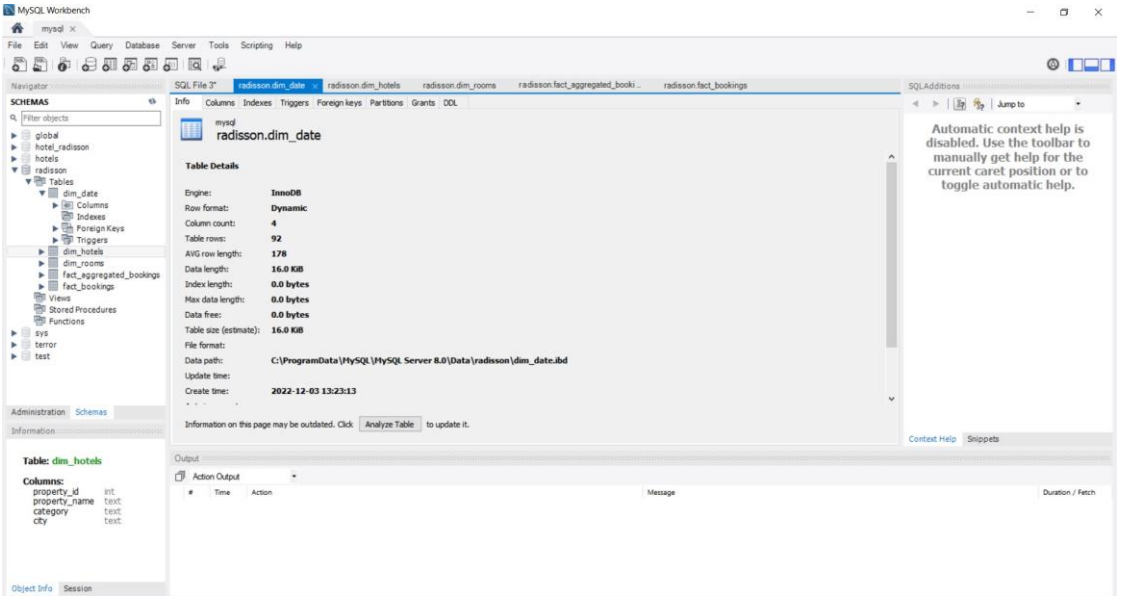
MySQL Workbench
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Columns:
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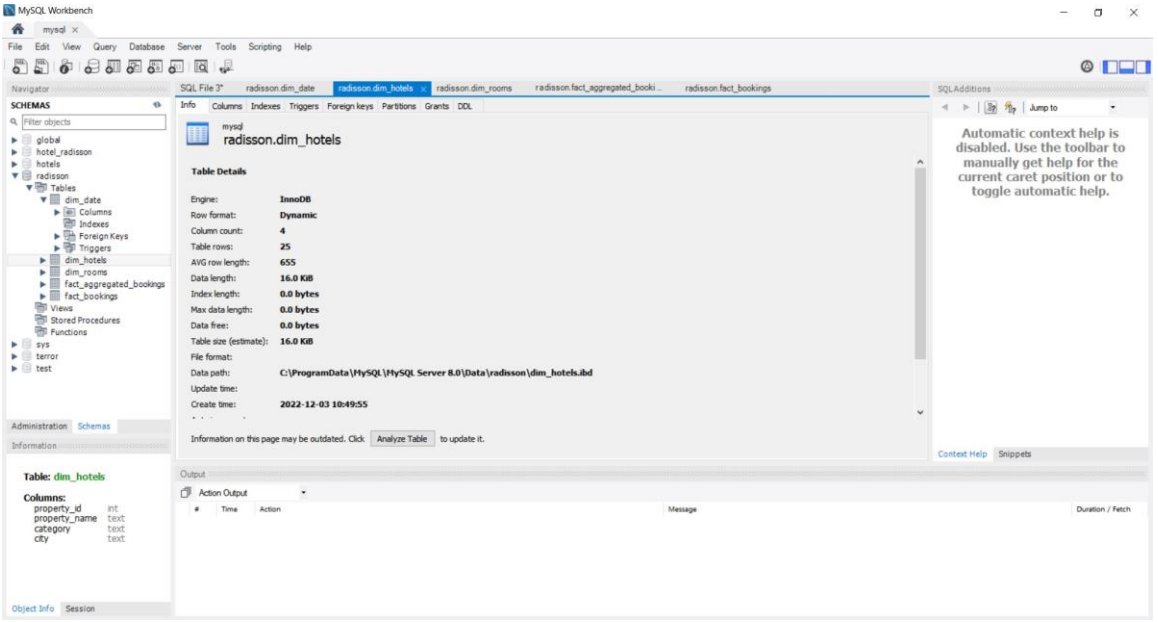
category text
city text


MySQL Workbench
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Information
Table: dim_hotels
Columns:
property_id int
property_name text
category text
city text
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Info Columns Indexes Triggers Foreign keys Partitions Grants DDL
mysql
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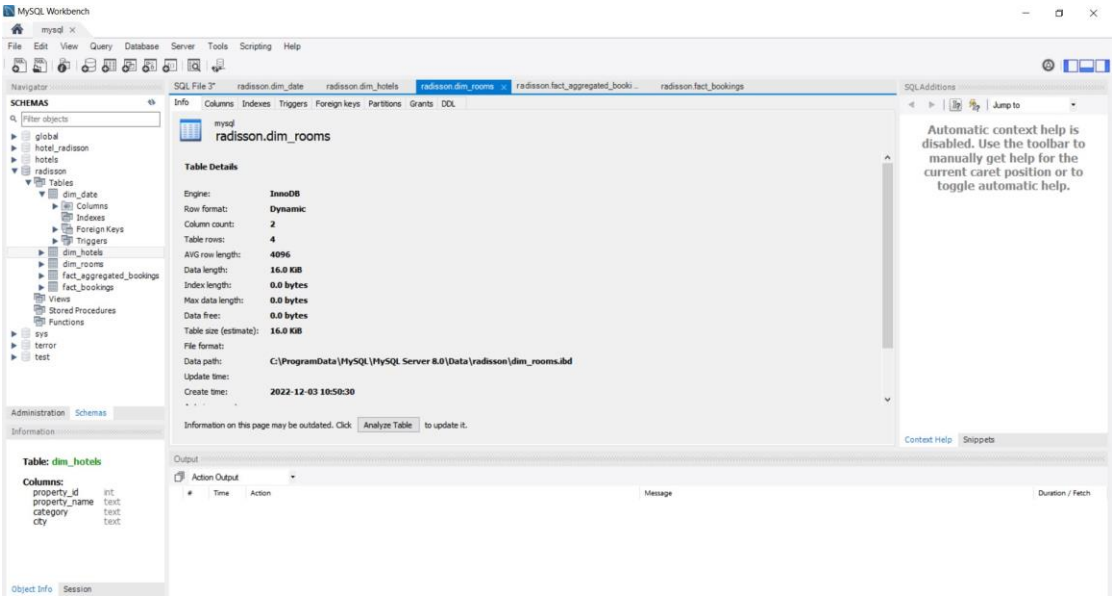
SQL Additions
Jump to
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Context Help Snippets
Output
Action Output
Time Action Message Duration / Fetch


MySQL Workbench
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File Edit View Query Database Server Tools Scripting Help
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Tables
dim_date
Columns
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fact_aggregated_bookings
fact_bookings
Views
Stored Procedures
Functions
sys
terror
test
Administration Schemas
Information
Table: dim_hotels
Columns:
property_id int
property_name text
category text
city text
Object Info Session
SQL File 3* radisson.dim_date radisson.dim_hotels radisson.dim_rooms radisson.fact_aggregated_booki ... radisson.fact_bookings
Info Columns Indexes Triggers Foreign keys Partitions Grants DDL
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radisson.dim_rooms
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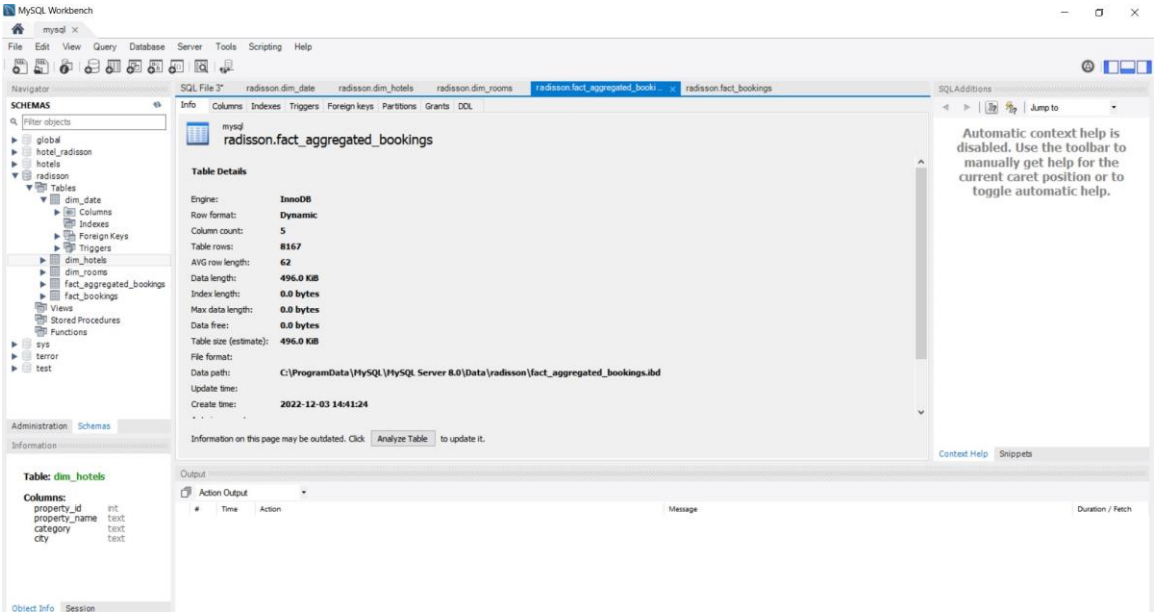
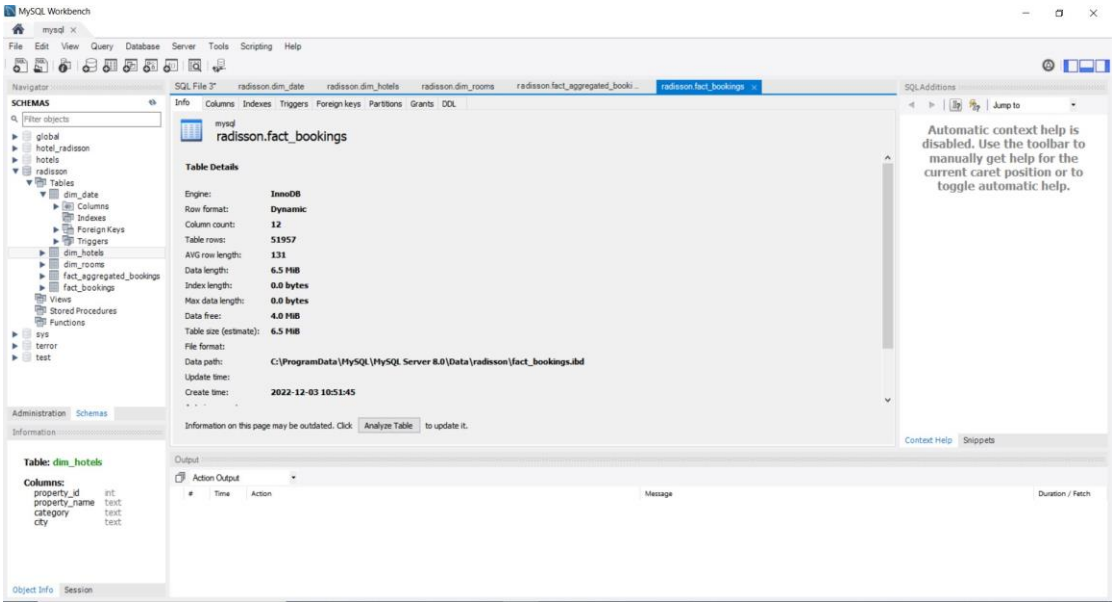
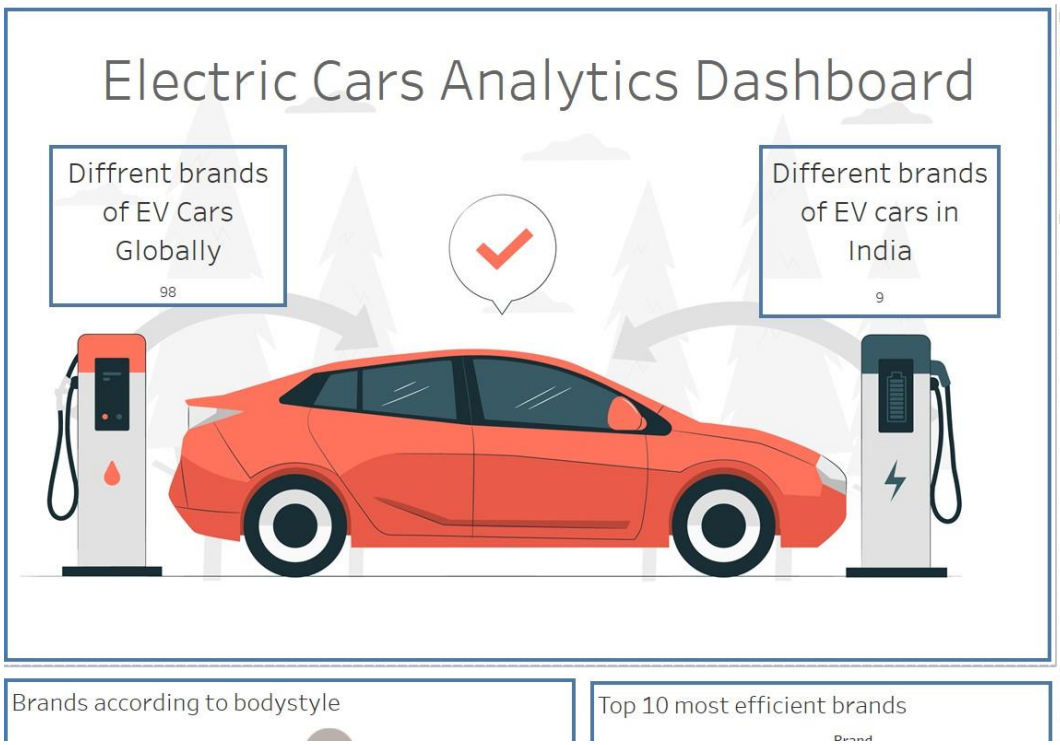
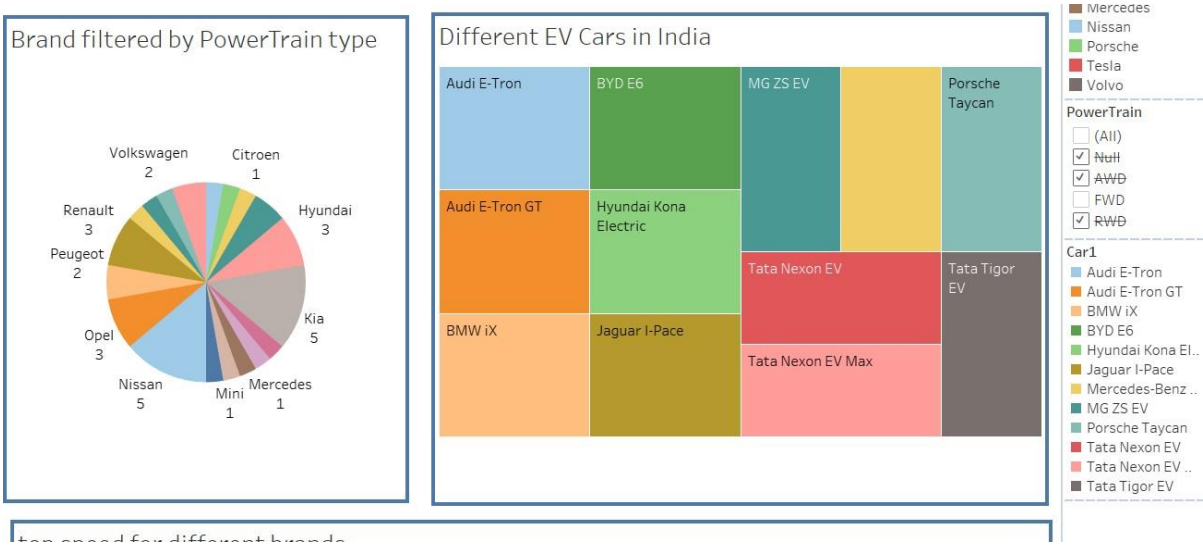
Update time:
Create time: 2022-12-03 10:50:30
Information on this page may be outdated. Click Analyze Table to update it.
SQL Additions
Jump to
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Context Help Snippets
Output
Action Output
Time Action Message Duration / Fetch



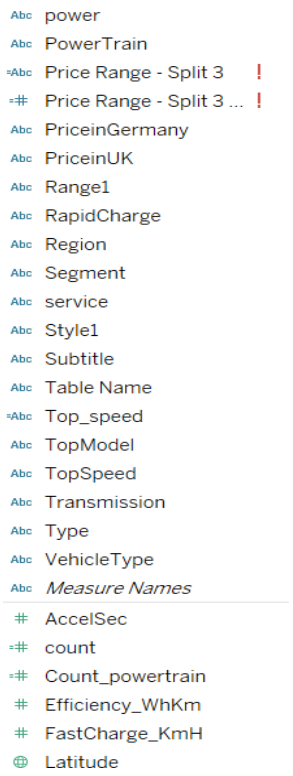


Activity 2: Utilization of Data Filters





Activity 3: No of Calculation Fields



Activity 4: No of Visualizations/ Graphs

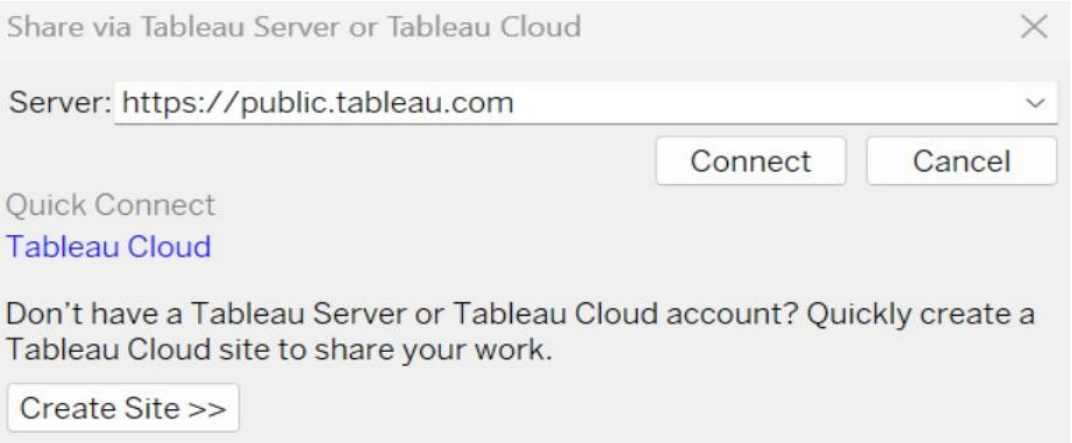
1. Charging Stations by region and type in India
2. EV Charging stations map of India
3. Different EV cars in India
4. Top speed for different Brands
5. Price for different cars in India
6. Top 10 most efficient EV Brands
7. Brands according to Bodystyle
8. Brand filtered by PowerTrain type
9. No of models by each brand
10. Summary card for Different brands of EV Cars globally
11. Summary card for Different brands of EV Cars in India

Milestone 8: 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 share button on the top ribbon



Give the server address of your tableau public account and click on connect.

Explanation Video:-

https://drive.google.com/file/d/1HU4uV8P8Hc53eu0XxYHPRlu51YFK-8NA/view?usp=share_link

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

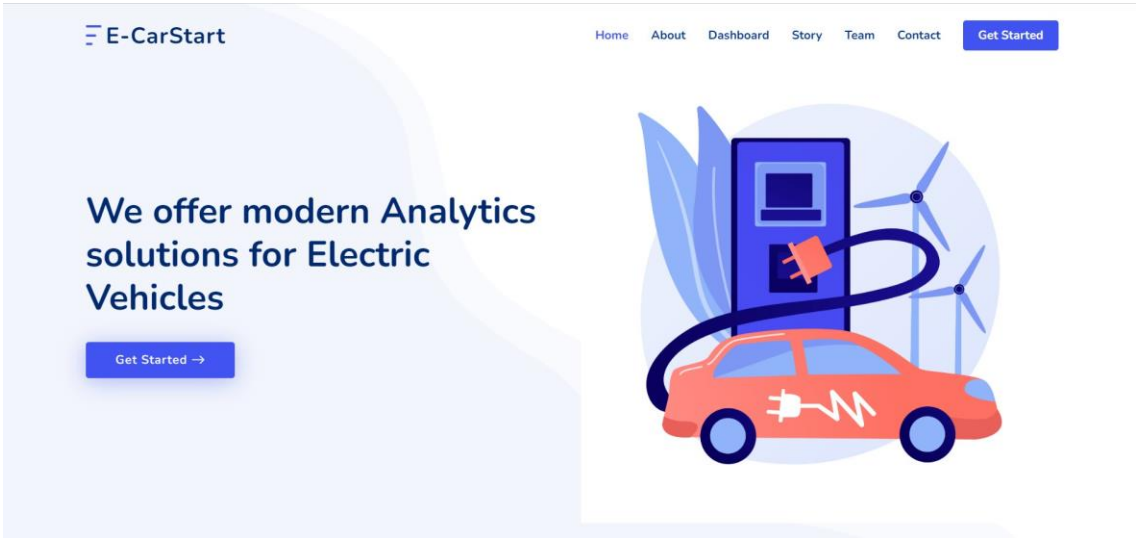
Once you login into your tableau public using the credentials, the particular visualization will be published into tableau public

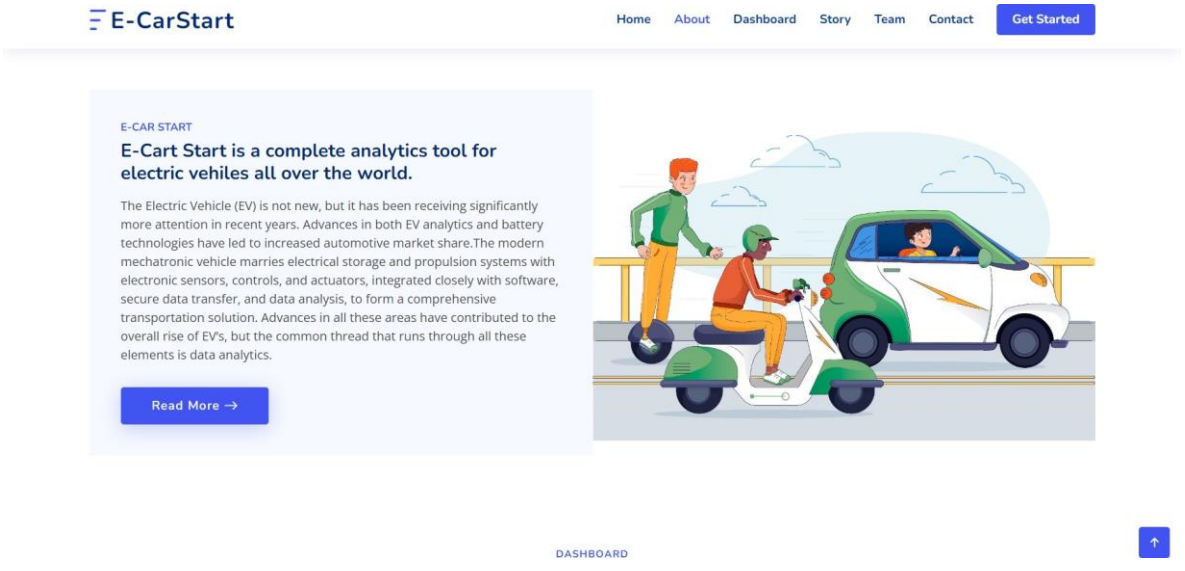
Note: While publishing the visualization to the public, the respective sheet will get published when you click on share option.

Activity 1: Dashboard and Story embed with UI With Flask

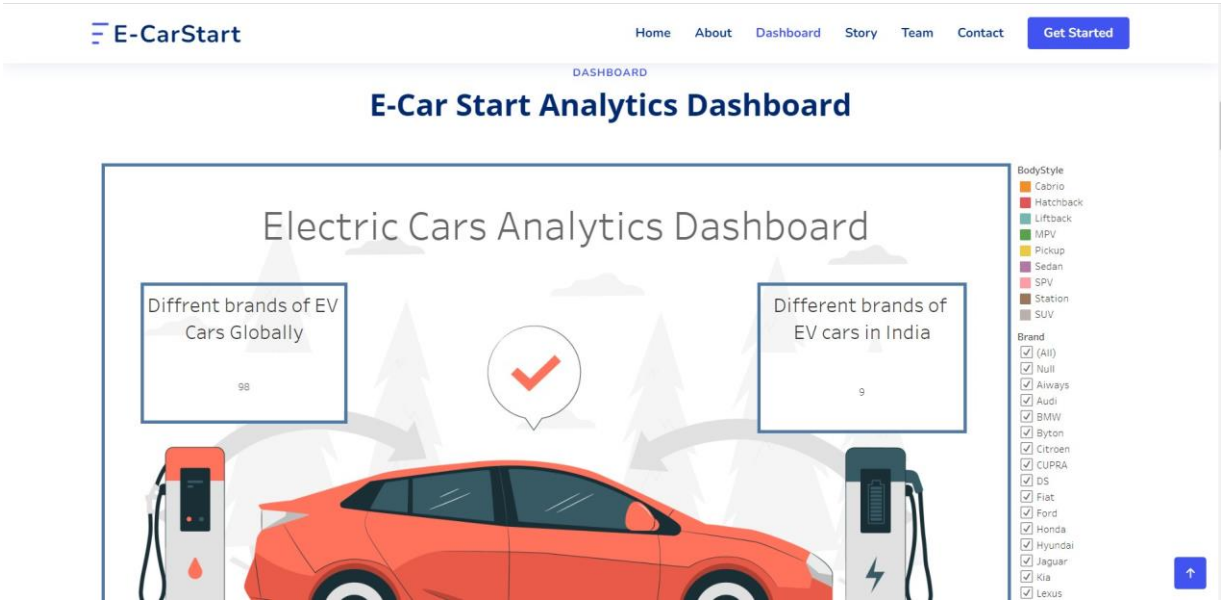
Explanation video link:

https://drive.google.com/file/d/1gp1P4Z0klYReDsWbGK-HGOd3uRS5QjR1/view?usp=share_link





DASHBOARD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DASHBOARD
E-Car Start Analytics Dashboard
Electric Cars Analytics Dashboard
Diffrent brands of EV Cars Globally
98
Different brands of EV cars in India
9
BodyStyle
Cabrio
Hatchback
Liftback
MPV
Pickup
Sedan
SPV
Station
SUV
Brand
(All)
Null
Always
Audi
BMW
Byton
Citroen
CUPRA
DS
Fiat
Ford
Honda
Hyundai
Jaguar
Kia
Lexus


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SUV Ford
SUV Audi
Hatchback Nissan
Sedan
SUV Tesla
Pickup
SUV Kia
SUV Skoda
Hatchback Volkswagen
Liftback
SUV
SUV
Sedan Porsche
Top 10 most efficient brands
Brand
Max. Efficiency_WhKm
250
200
150
100
50
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Mercedes
Audi
Tesla
Byton
Nissan
Jaguar
Porsche
Ford
BMW
Volvo
Mazda
Mercedes
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Nissan
Opel
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Polestar
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Skoda
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Audi
BMW
Byton
Ford
Jaguar
Mercedes
Nissan
Porsche
Tesla
Volvo
PowerTrain
(All)
Null
AWD
FWD

FEATURES

There are many different features of our project

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There are many different features of our project

- Analyse the currect stats
- Get to know EV more
- Know about Charging Stations
- Top performing Brands
- different brands in India
- different brands Globally

Overview of Electric Vehicle Sector

OVERVIEW PRICING

ELECTRIC

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Overview of Electric Vehicle Sector

OVERVIEW PRICING

The supply of fossil fuels is constantly decreasing. The situation is very alarming. It is time for the world to slowly adapt to electric vehicles.

✓ **A lot of change needs to happen**

Major carmakers like Tesla and Porsche manufacture many electric vehicles.

✓ **The improvement of battery technology in recent years has led to the higher popularity of electric vehicles.**

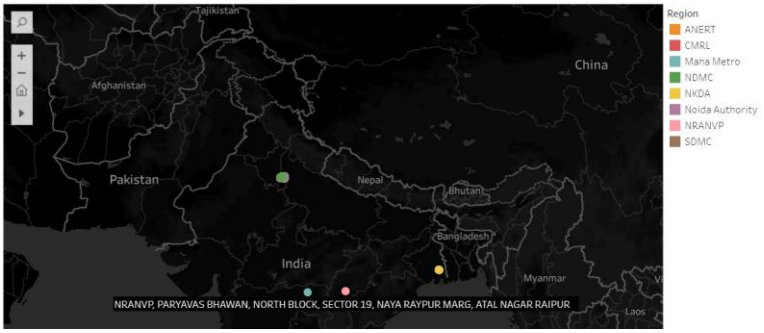
Buying an electric vehicle can be a great choice for consumers. The drive quality, low noise levels, and convenience are really great.

STORY

Electric vehicles Analytics Story

Story of Electric Cars In India

Charging Stations in India | Charging Stations in different regions as per the type | Price Range of Different Electric Cars in India | Different Brands & no of Models



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TESTIMONIALS

What they are saying about us

Fugiat enim eram quae cillum dolore dolor amet nulla culpa multos export minim fugiat minim velit minim dolor enim duis veniam ipsum anim magna sunt elit fore quem dolore labore illum veniam.

Matt Brandon
Freelancer

★★★★★

Quis quorum aliqua sint quem legam fore sunt eram irure aliqua veniam tempor noster veniam enim culpa labore duis sunt culpa nulla illum cillum fugiat legam esse veniam culpa fore nisi cillum quid.

John Larson
Entrepreneur

Proin iaculis purus consequat sem cure digni ssim donec porttitora entum suscipit rhoncus. Accusantium quam, ultricies eget id, aliquam eget nibh et. Maecen aliquam, risus at semper.

Saul Goodman
Ceo & Founder

E-CarStart

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TEAM

Our hard working team

Walter White

Chief Executive Officer

Velit aut quia fugit et et. Dolorum ea voluptate vel tempore tenetur ipsa quae aut. Ipsum exercitationem iure minima enim corporis et voluptate.

Sarah Jhonson

Product Manager

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William Anderson

CTO

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Amanda Jepson

Accountant

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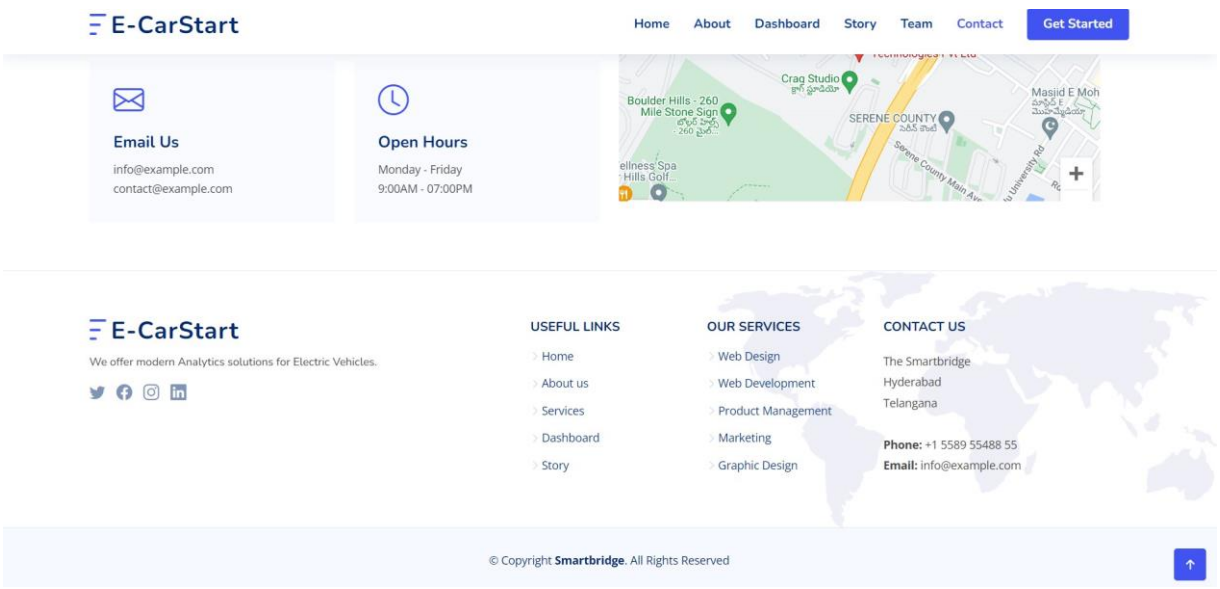
contact@example.com

Open Hours

Monday - Friday
9:00AM - 07:00PM



Milestone 9: Project Demonstration & Documentation

Activity 1:- Record explanation Video for project end to end solution

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

https://drive.google.com/file/d/11A3XNupGXhI0Z7kd8crC7oZoSUHqXFsQ/view?usp=drivesdk

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

Here is the empathy map link of our project for your reference:
https://app.mural.co/invitation/mural/visulizationtoolforelectrica0359/1681462344584?sender=u6f0d09faa15a80ea06937735&key=5135cb33-2ddc-405b-b762-d67a81d74f4d

Here is the link for brainstorming and ideation in mural:
https://app.mural.co/invitation/mural/visulizationtoolforelectrica0359/1681554303995?sender=u6f0d09faa15a80ea06937735&key=538f956b-1b89-42cc-a4a4-0929f691f48a