

PROJECT:

VISUALIZATION TOOL FOR ELECTRIC VEHICLE CHARGE AND RANGE ANALYSIS



Category: Data Analytics

Skills Required:

Exploratory Data Analysis, MySQL, Databases, Tableau

Team leader: MERUGU LOHITHAKSHARI

Team members: 1) MUNASA MOURYA

2) MUTTHA NANDINI

3)MOHAMMAD KHAJA MOUINHIDDIN CISTY BABU

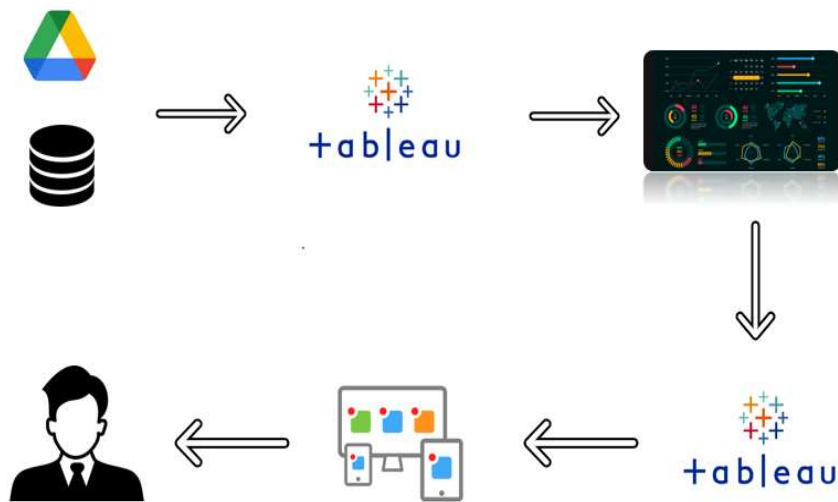
4)MOGILI JANARDHAN

VISUALIZATION TOOL FOR ELECTRIC CHARGE AND RANGE ANALYSIS

Project Description:

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.

Technical Architecture:



Project Flow

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

Data Collection

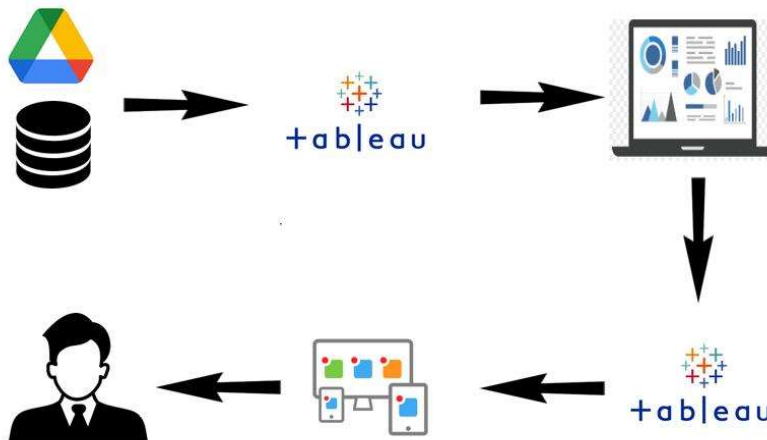
Working With Dataset

Data Visualization

Dashboard

Story

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:**
- **Univariate, Bi- Variate and Multi-Variate Analysis**
- **Chart Types:**
- **Tableau:**
- **Business Intelligence:**

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/190Qmq27LeZZ_nWricP3Obl7ys_5otEsp/view?usp=sharing

Working With Dataset

Understand The Data

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

1. EV India

2. Electric _vehicle _charging _station _list

3. Electric Car Data _Clean

4. Cheapest electric cars –EV Database

Column Description for EV India:

- Car - Car Brand name and model
- Style Range - Style range of car
- Transmission- Transmission type
- Vehicle Type – Type of vehicle
- Price Range (Lakhs) - Price Range in Lakhs
- Capacity - Capacity of car
- Boot Space – Boot space of the car
- Base Model – Base model name
- Top Model – Top model name

Column Description for Electric _vehicle _charging _station _list:

- region: This column represents the region of the charging station.
- address: This column represents the address of the charging station.
- aux address: This column represents the auxiliary address of the charging station.
- latitude: This column represents the latitude of the charging station.
- longitude: This column represents the longitude of the charging station
- type: This column represents the type of charging station.
- power: This column represents the power of the charging station. [OBJ]
- service: This column represents the type of service at the charging station.

Column Description for Electric Car Data _Clean:

- Brand
- Model
- Accel Sec
- TopSpeedKmH
- RangeKm
- EfficiencyWhKm
- FastChargeKmH
- Rapid Charge
- Powertrain
- Plug Type
- Body Style
- Segment
- Seats
- Price Euro

Column Description for Cheapest electric cars-EV

Database:

- Name
- Subtitle
- Acceleration
- Top Speed
- Range
- Efficiency
- Fast ChargeSpeed
- Drive
- Number ofSeats
- Pricein Germany
- Price Inuk

Loading The Dataset

Before you can build a view and analyze your data, you must first connect Tableau to your data. Tableau supports connecting to a wide variety of data, stored in a variety of places.

The data might be stored on your computer in a spreadsheet or a text file, or in a big data, relational, or cube (multidimensional) database on a server in your enterprise.

In our case, we will be using a spreadsheet or text file for making our analysis. Watch the video to understand the connection of the dataset in Tableau.

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.

Visualizations Of ELECTRIC VEHICLE CHARGE AND RANGE ANALYSIS

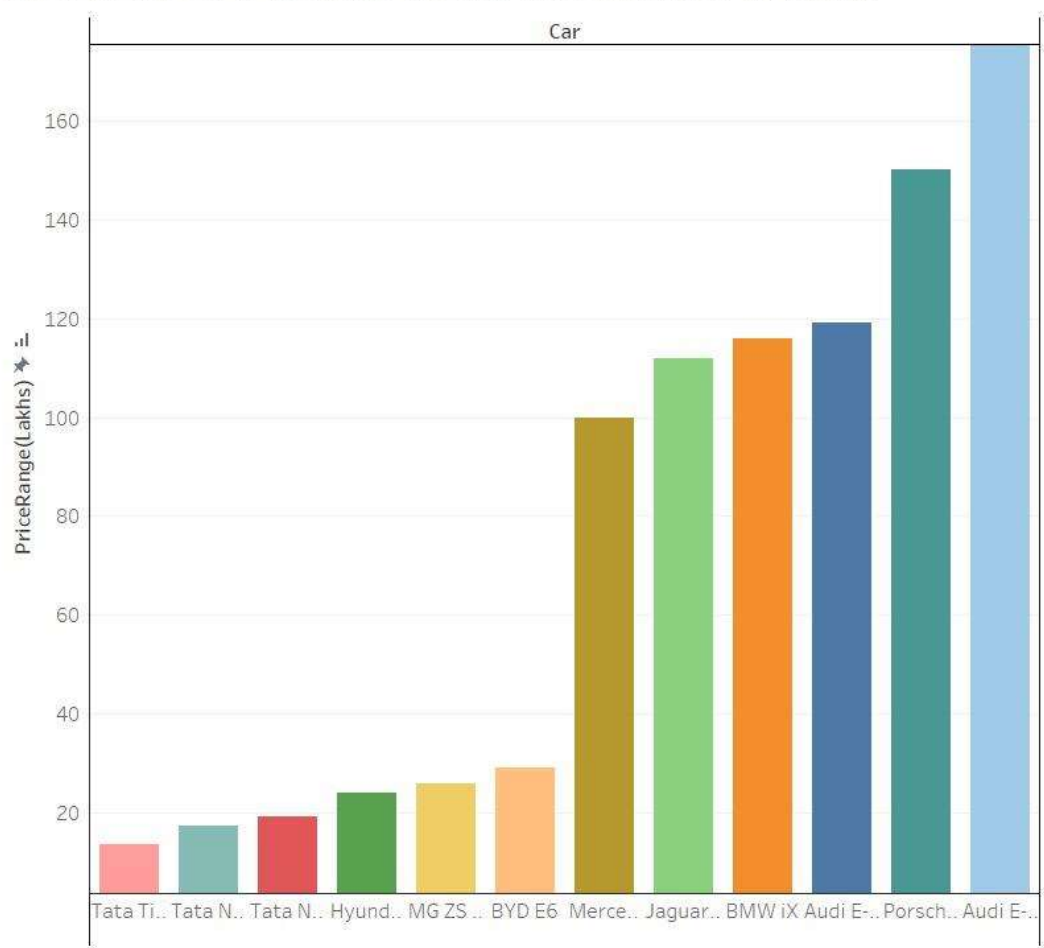
Using the electric vehicle charge and range analysis dataset, we plan to create a dashboard showing the facts about the price ranges of different electric vehicle cars in India. These visualizations help us to get a better understanding of the data in a single look, as well as is easily understandable to a layman.

DIFFERENT EV CARS AND THEIR PRICE RANGES IN INDIA

For visualizing the above, we will require the following data

- cars
- Price range

DIFFERENT EV CARS AND THEIR PRICE RANGES IN INDIA



•

FAST CHARGE EV CAR BRANDS



From this data, we will be plotting a “circle view chart” to see the fastest charge electric vehicle charge brands in India.

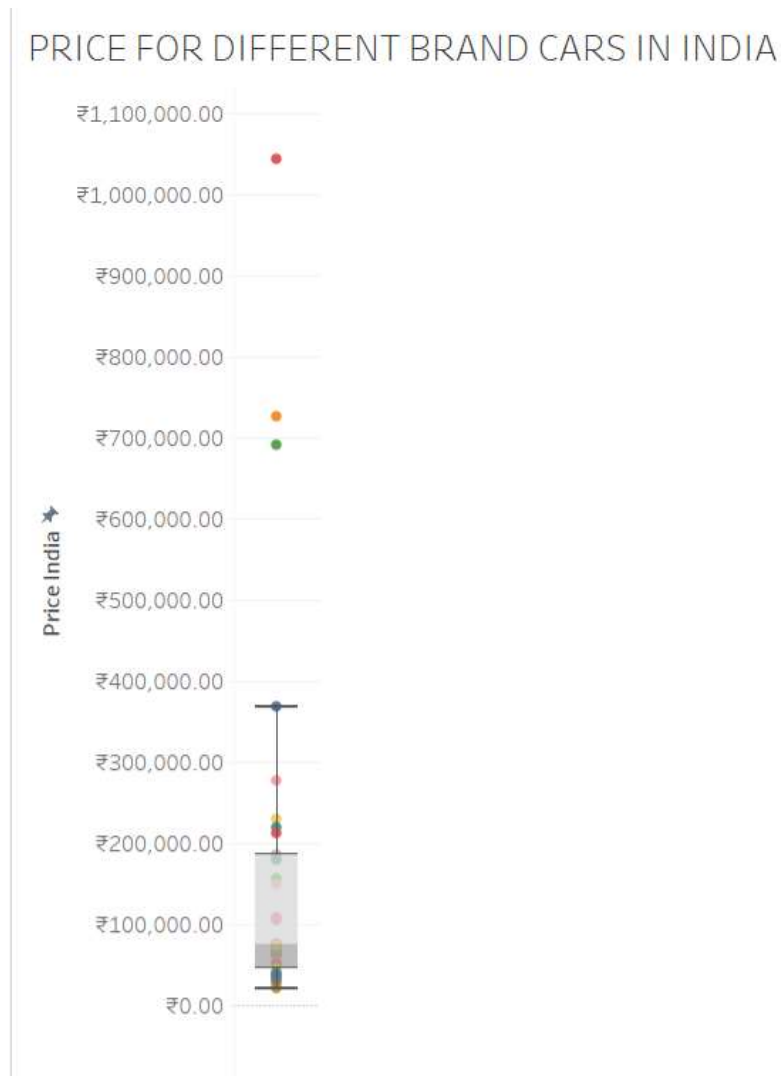
Refer to the video below to create the visualization for the above statement.

RANGE AND STYLES OF EV CARS

In this milestone, we will analyze the range and styles of EV cars.

THE RANGE AND STYLES OF EV CARS





PRICE FOR DIFFERENT BRAND CARS IN INDIA:

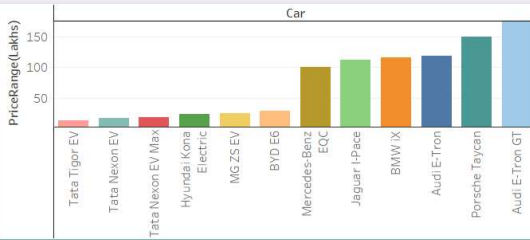
The above chart or visualization is a box and whisker- plots. The box and whisker-plots represent the price for different brand cars in India. Here we taken the many cars' brands like Tesla, Audi, Volkswagen, Porsche. Here the tesla has got the highest price in India when compared to the other car brands.

Dashboard

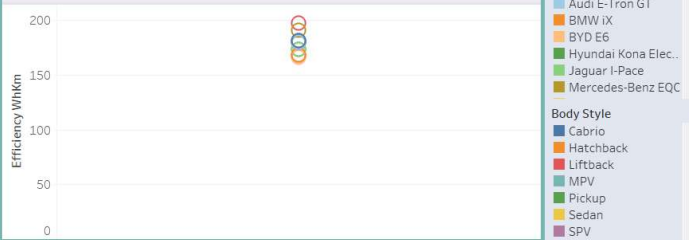
A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of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

ELECTRIC CARS ANALYTICS DASHBOARD 1

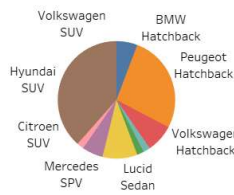
DIFFERENT EV CARS AND THEIR PRICE RANGES IN INDIA



TOP MOST EFFICIENT EV MODELS



BRANDS ACCORDING TO BODY STYLE



TOP SPEED FOR DIFFERENT BRANDS



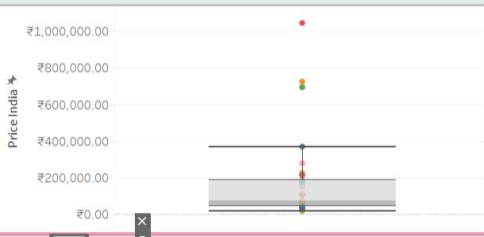
- Car**
 - Audi E-Tron
 - Audi E-Tron GT
 - BMW iX
 - BYD E6
 - Hyundai Kona Electric
 - Jaguar I-Pace
 - Mercedes-Benz EQC
- Body Style**
 - Cabrio
 - Hatchback
 - Liftback
 - MPV
 - Pickup
 - Sedan
 - SPV
- Brand**
 - Always
 - Audi
 - BMW
 - Byton
 - Citroen
 - CUPRA
 - DS
- Model**
 - 2
 - 3 Crossback E-Ten
 - 500e Convertible
 - 500e Hatchback
 - Air
 - Ampera-e
 - Ariya 63kWh

ELECTRIC CARS ANALYTICS DASHBOARD 2

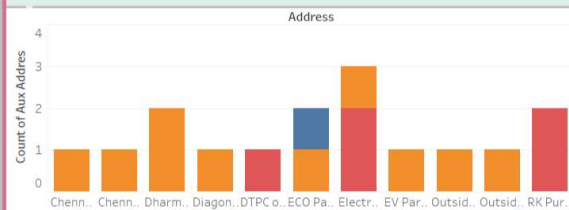
RANGE OF A MODEL BRAND CAR

Brand	Model	Range (km)
Always	U5	335
Audi	e-tron 50 quattro	280
	e-tron 55 quattro	365
	e-tron GT	425
	e-tron S 55 quattro	320
	e-tron S Sportback 50	335
	e-tron Sportback 50	295
	e-tron Sportback 55	380
	Q4 e-tron	400

PRICE FOR DIFFERENT BRAND CARS IN INDIA



CHARGING STATIONS BY ADDRESS AND POWER IN INDIA



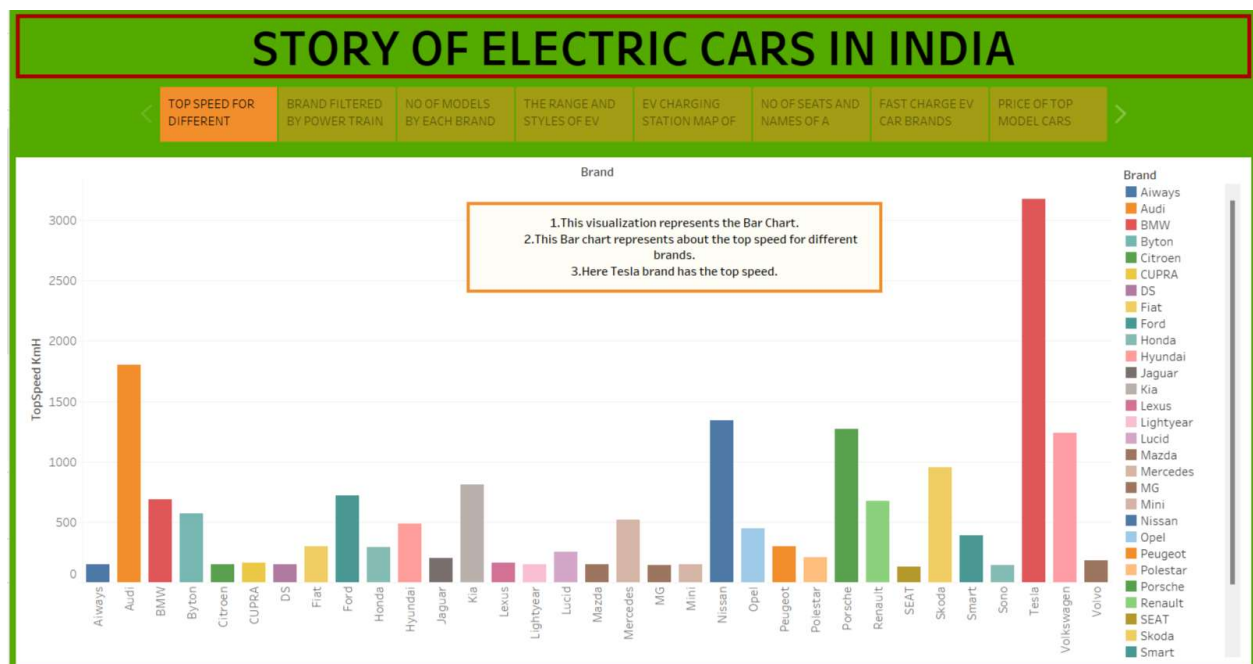
COUNT OF EV CHARGING STATIONS IN A REGION WITH ADDRESSES

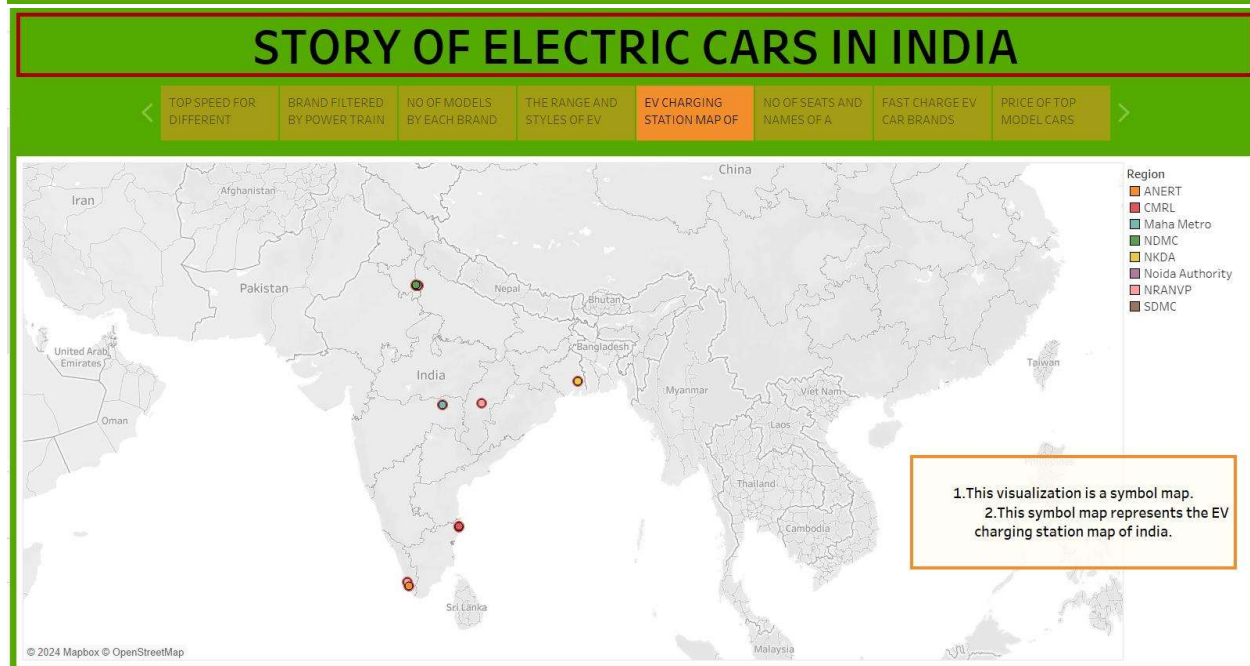
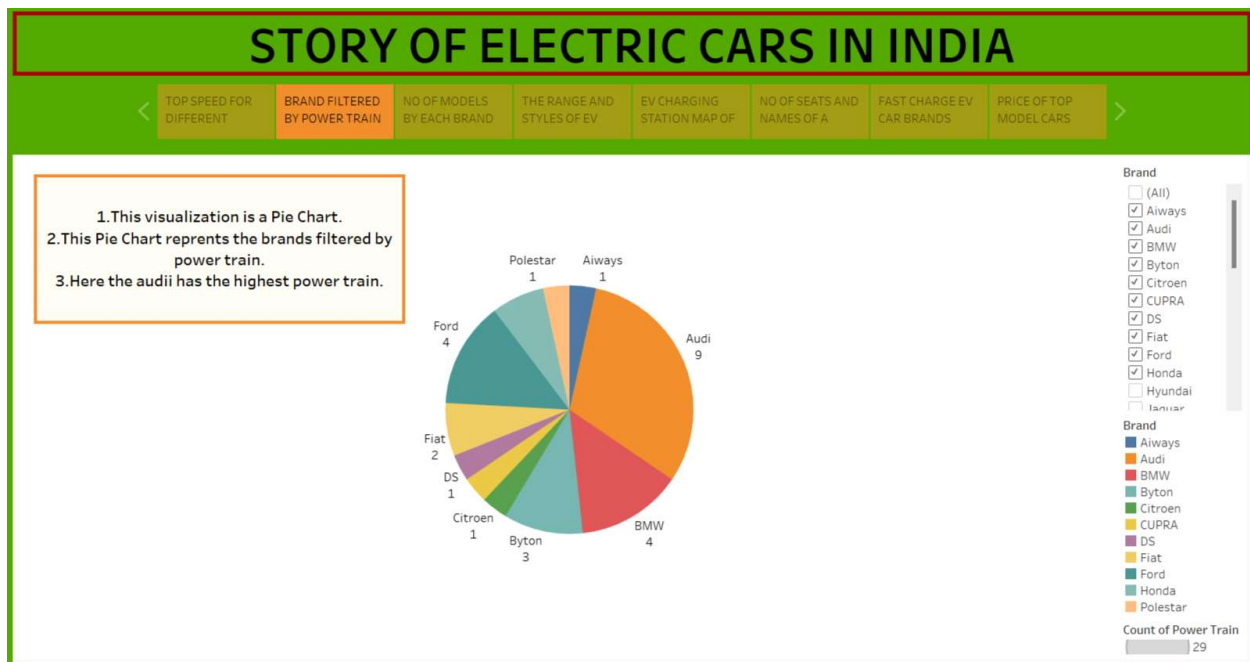
Region	Address	Count
ANERT	DTPC office, thiruva..	1
	KTDC Tourist Recept..	2
	Shanghumukham be..	1
	State Council For Chi..	2
CMRL	Anna Nagar East Me..	2
	Chennai Egmore me..	1

- Power**
 - 10(3.3 kW each)
 - 15 kW
 - 142kW
- Brand**
 - (All)
 - Always
 - Audi
 - BMW
 - Byton
 - Citroen
 - CUPRA
 - DS
 - Fiat
 - Ford
- Brand**
 - Always
 - Audi
 - BMW
 - Byton
 - Citroen
 - CUPRA
 - DS
 - Fiat
 - Ford
 - Honda
 - Hyundai
- Count of electric_vehicle**
 - 1

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.



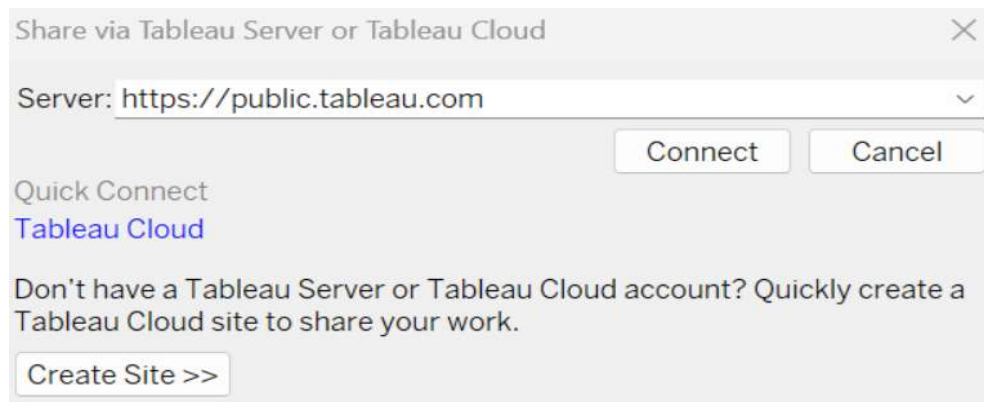


Publishing And Web Integration

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

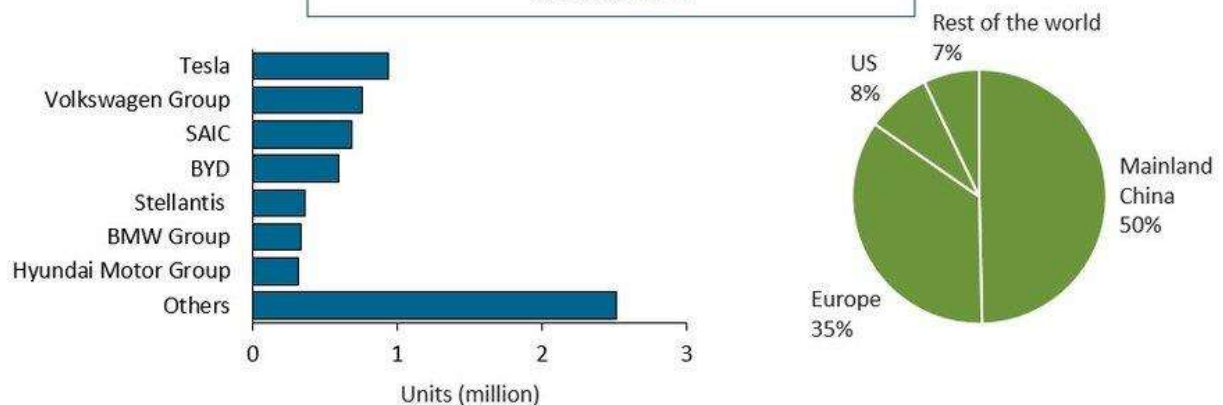
VISUALIZATION TOOLS FOR ELECTRIC VEHICLE CHARGE AND RANGE ANALYSIS

SPEED THRILLS BUT KILLS



Tesla leads the EV market, but competitors gather

Worldwide electric vehicle* sales by manufacturer
and major market 2021: 6.5 million units
Growth: 109%



*includes battery electric vehicles and plug-in hybrid electric vehicles
Source: Canalys estimates, February 2022

ELECTRIC VEHICLE MARKET GLOBAL FORECAST TO 2030 (USD BILLION)



CAGR OF
13.7%

The EV market is expected to be worth USD 951.9 billion by 2030, growing at a CAGR of 13.7% during the forecast period.

