Project Report

ON

Visualization Tool for Electric Vehicle Charge and Range Analysis

Team ID: LTVIP2026TMIDS75472

BY

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1.INTRODUCTION

1.1 Project Overview

The Visualization Tool for Electric Vehicle Charge and Range Analysis project focuses on analyzing and visualizing data related to electric vehicles (EVs) using Tableau. The project integrates multiple datasets containing EV specifications, pricing, brand performance, charging infrastructure, and regional distribution to provide meaningful insights.

The dashboard presents key information such as EV market trends, brand comparisons, efficiency metrics, price variations, and charging station availability across different regions. Various interactive visualizations like bar charts, maps, treemaps, and KPI indicators are used to simplify complex data and make it easy to understand.

This project helps users explore EV data effectively and supports data-driven decision-making for stakeholders such as customers, researchers, and policymakers.

1.2 Purpose

The main purpose of this project is to analyze electric vehicle data and present insights through an interactive and user-friendly dashboard. It aims to:

- Provide a clear understanding of EV market trends and growth
- Compare different EV brands based on performance, price, and efficiency
- Analyze charging infrastructure availability across regions
- Help users make informed decisions regarding EV selection
- Support awareness of sustainable transportation and future mobility trends

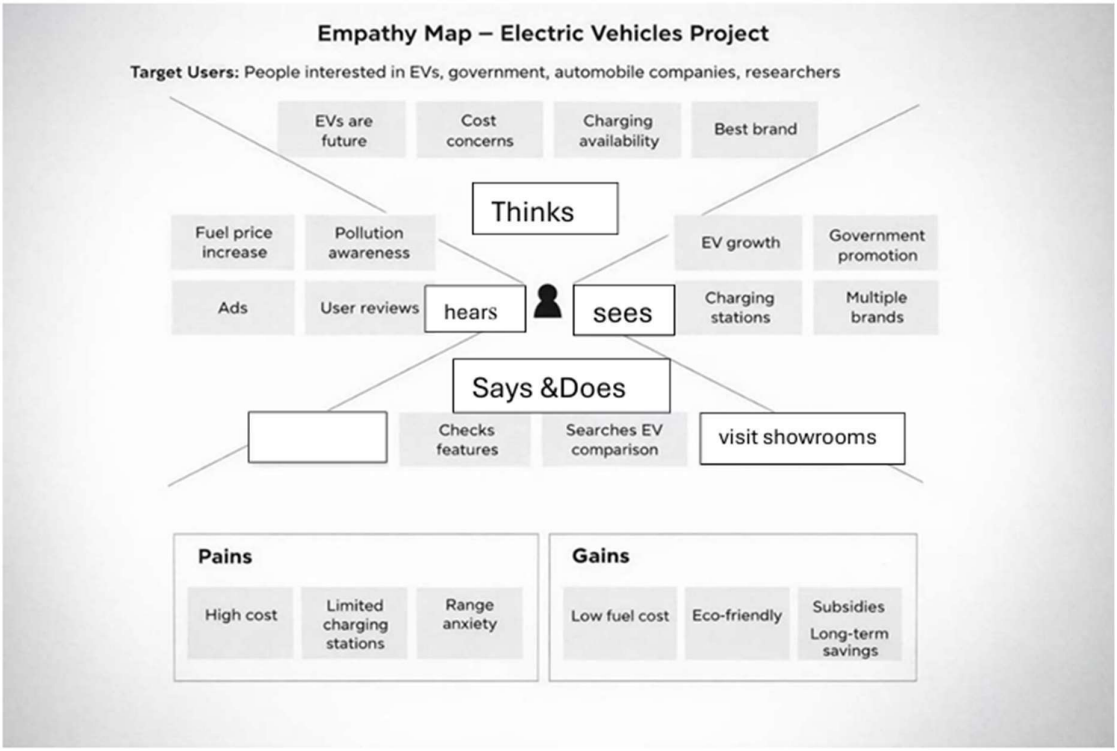
The project also demonstrates the use of data visualization tools like Tableau to transform raw data into actionable insights.

2.IDEATION PHASE

2.1 Problem Statement

Analysing different data from Multiple sources for Electric cars in India and Globally. We have 4 Different datasets we need to analyse the data and create Dashboard and story that can represent the data and show the Visuals for the data.

2.2 Empathy Map Canvas



2.2 Brainstorming

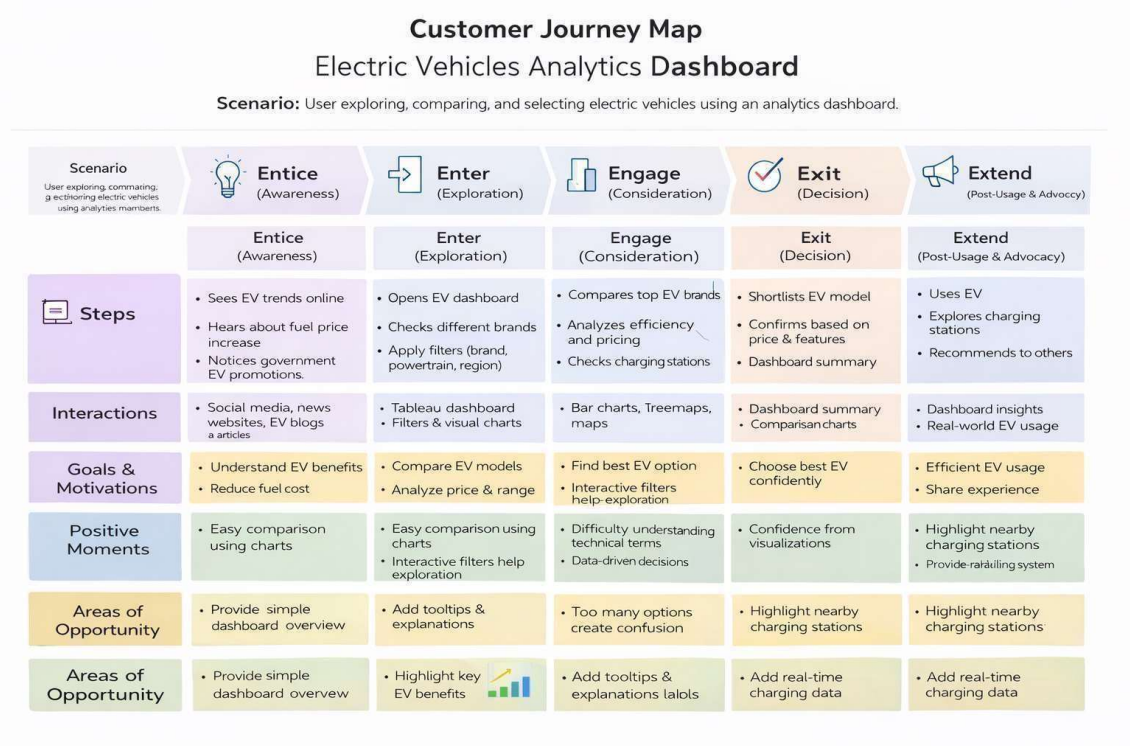
Step-1: Team Gathering, Collaboration and Select the Problem Statement Our team gathered and discussed various real-world problems related to transportation, environment, and technology. After discussion, we selected the problem of analyzing electric vehicles growth and performance in India. This problem was chosen because EV adoption is increasing and needs proper analysis for better understanding and decision-making.

Step-2: Brainstorm, Idea Listing and Grouping The team brainstormed ideas such as EV sales trends, brand comparison, charging infrastructure, EV vs fuel vehicles, and price-performance analysis. These ideas were grouped into categories like Sales Analysis, Brand Comparison, Performance Metrics, and Infrastructure Analysis.

Step-3: Idea Prioritization Ideas were prioritized based on feasibility, data availability, impact, and ease of implementation. Final selected ideas include EV growth trends, brand comparison, price-performance analysis, and charging infrastructure visualization.

3.REQUIREMENT ANALYSIS

3.1 Customer Journey Map



3.2 Solution Requirement

Functional Requirements

FR No.	Requirement	Description
FR-1	Data Input	System should accept EV data from Excel/CSV files
FR-2	Data Processing	System should clean and transform data using Tableau
FR-3	Dashboard Creation	System should generate interactive dashboards
FR-4	Story Creation	System should create a story for insights
FR-5	Publish to Tableau Public	System should publish dashboards online
FR-6	Web Integration	System should embed dashboard & story using iframe
FR-7	User Interaction	Users should be able to interact with filters and charts

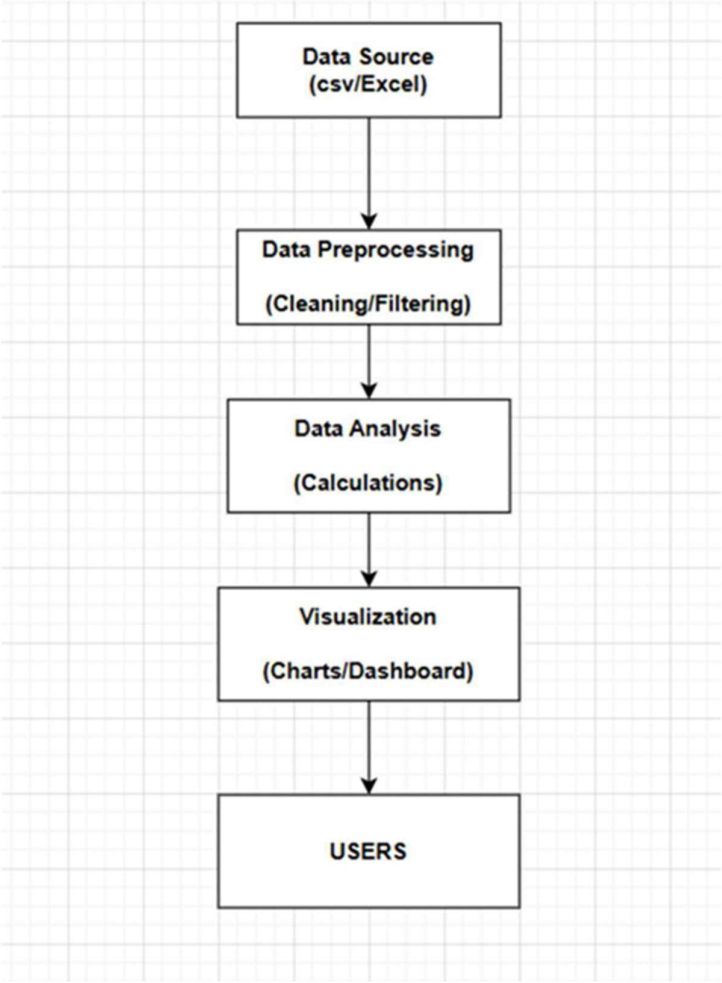
NON Functional Requirements

NFR No.	Requirement	Description
NFR-1	Performance	Dashboard should load quickly in browser
NFR-2	Usability	Interface should be simple and user-friendly
NFR-3	Reliability	System should work without errors
NFR-4	Scalability	Should support larger datasets in future

NFR-5 Compatibility Should work on all browsers (Chrome, Edge)

NFR-6 Availability Website should be accessible online anytime

3.3 Data Flow Diagram



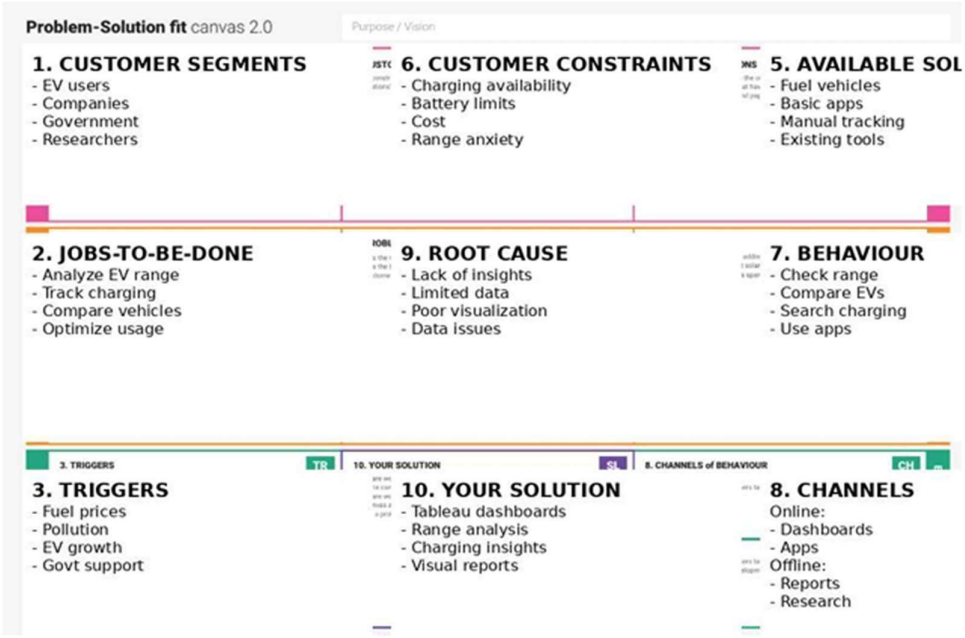
3.4 Technology Stack

Layer	Technology	Description
Data Source	Excel / CSV	Stores electric vehicle dataset (price, range, battery, etc.)
Processing	Tableau Prep / Tableau Desktop	Used for data cleaning and Data transformation

Query / Analysis	SQL (in Tableau)	Used for calculations and data querying
Visualization	Tableau Desktop	Creates dashboards, charts, and stories
Visualization Engine	Tableau Engine (VizQL)	Converts user actions into visual outputs
Visualization Hosting	Tableau Public	Publishes dashboards and provides shareable links
Web Structure	HTML	Builds the structure of the website
Styling	CSS	Designs layout, colors, and appearance
UI Framework	Bootstrap	Provides responsive design and UI components
Integration	iFrame	Embeds Tableau dashboard and story into webpage
Deployment	GitHub Pages	Hosts the website online for public access
Client Interface	Web Browser	Allows users to view and interact with the system

4.PROJECT DESIGN

4.1 Problem Solution Fit



4. EMOTIONS: BEFORE / AFTER (EM)

Before:

- Confusion with raw data
- Stress due to manual work
- Lack of clarity in decisions

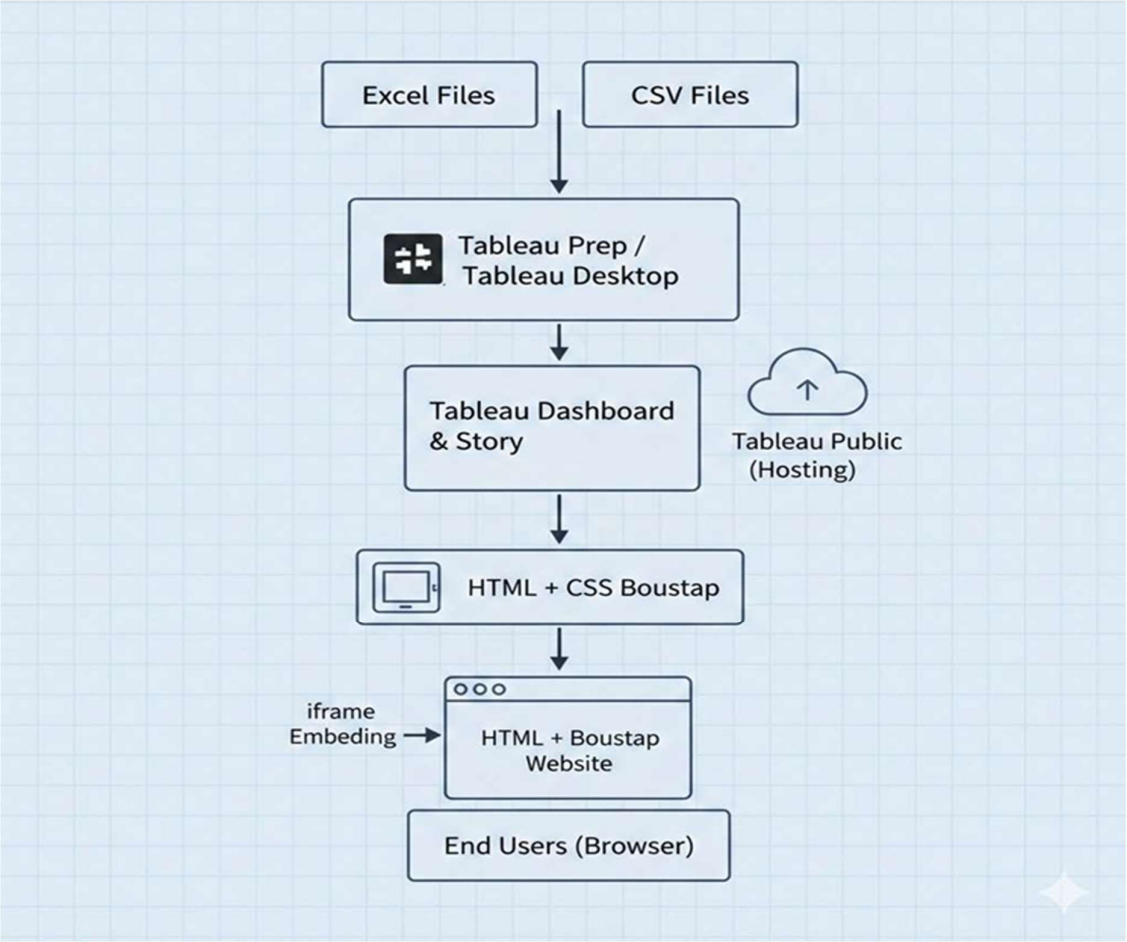
After:

- Confidence with insights
- Faster decision-making
- Satisfaction with clear visual reports

4.2 Proposed Solution

S.No.	Parameter	Description
1	Problem Statement (Problem to be solved)	The rapid growth of electric vehicles has generated large amounts of data related to pricing, battery capacity, range, and charging infrastructure. However, this data is not easily understandable for users, researchers, or decision-makers. There is a need for a system that can analyze and visualize EV data effectively to provide meaningful insights.
2	Idea / Solution description	The proposed solution is an Electric Cars Analytics Dashboard developed using Tableau. The system collects EV data from Excel/CSV sources, processes it using Tableau, and creates interactive dashboards and stories. These visualizations are published on Tableau Public and embedded into a responsive website built using HTML, CSS, and Bootstrap. Users can access and interact with the dashboard through the website.
3	Novelty / Uniqueness	Integration of Tableau dashboards with a web-based interface. Use of interactive storytelling for better understanding. Combination of data analytics and web development. Provides a user-friendly visualization for both technical and non-technical users.
4	Social Impact / Customer Satisfaction	Helps users understand electric vehicle trends and performance. Promotes environmental awareness by encouraging EV adoption. Supports researchers and policymakers with data-driven insights. Provides an interactive and user-friendly experience.
5	Business Model (Revenue Model)	Can be used as a subscription-based analytics platform. Can collaborate with automobile companies for market insights. Revenue can be generated through advertisements or premium analytics features. Can be extended as a data analytics service.
6	Scalability of the Solution	The system can handle larger datasets by integrating with databases. It can be extended to include real-time data. It can be scaled to analyze other types of vehicles. The website can be deployed on cloud platforms for better scalability.

4.3 Solution Architecture



5.PROJECT PLANNING AND SCHEDULDING

5.1 Project Planning

PRODUCT BACKLOG

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	As a user, I can upload EV dataset (battery, range, charging time)	2	High	Team
Sprint-1	Data Cleaning	USN-2	As a user, I can clean and preprocess EV data for analysis	2	High	Team
Sprint-1	Data Integration	USN-3	As a user, I can integrate multiple EV datasets into one system	3	Medium	Team
Sprint-2	Visualization	USN-4	As a user, I can view EV range comparison charts	2	High	Team
Sprint-2	Visualization	USN-5	As a user, I can analyze charging time using graphs	2	High	Team
Sprint-2	Dashboard	USN-6	As a user, I can view interactive dashboard in Tableau	3	High	Team
Sprint-3	Filters & Analysis	USN-7	As a user, I can filter EV data by brand, battery, and range	2	Medium	Team
Sprint-3	Insights	USN-8	As a user, I can get insights on EV efficiency and performance	3	High	Team
Sprint-3	Comparison	USN-9	As a user, I can compare multiple EV models	2	Medium	Team
Sprint-4	Optimization	USN-10	As a user, I can identify best EV based on range & charging	3	High	Team

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-4	Reporting	USN-11	As a user, I can generate reports from dashboard	2	Medium	Team
Sprint-4	Deployment	USN-12	As a user, I can access dashboard online	3	High	Team

SPRINT SCHEDULE

Sprint	Total Story Points	Duration	Start Date	End Date	Completed Points	Release Date
Sprint-1	7	6 Days	Day 1	Day 6	7	Day 6
Sprint-2	7	6 Days	Day 7	Day 12	7	Day 12
Sprint-3	7	6 Days	Day 13	Day 18	7	Day 18
Sprint-4	8	6 Days	Day 19	Day 24	8	Day 24

PROJECT TRACKER

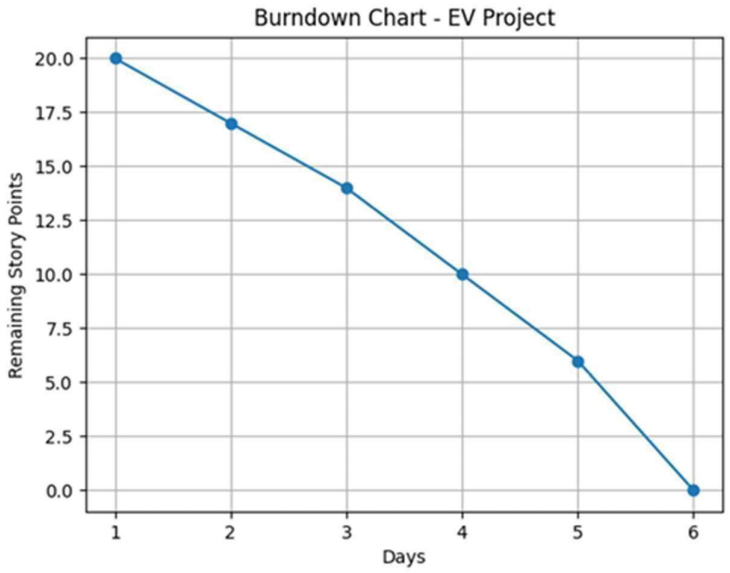
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed	Sprint Release Date (Actual)
Sprint-1	20	6 Days	27 Jan 2026	01 Feb 2026	20	01 Feb 2026
Sprint-2	20	6 Days	03 Feb 2026	08 Feb 2026	18	09 Feb 2026
Sprint-3	20	6 Days	10 Feb 2026	15 Feb 2026	20	15 Feb 2026
Sprint-4	20	6 Days	16 Feb 2026	20 Feb 2026	19	20 Feb 2026

VELOCITY

- Sprint Duration = **10 days (example)**
- Story Points = **20**

Velocity (AV) = 20 / 10 = 2 story points/day

Burndown Chart



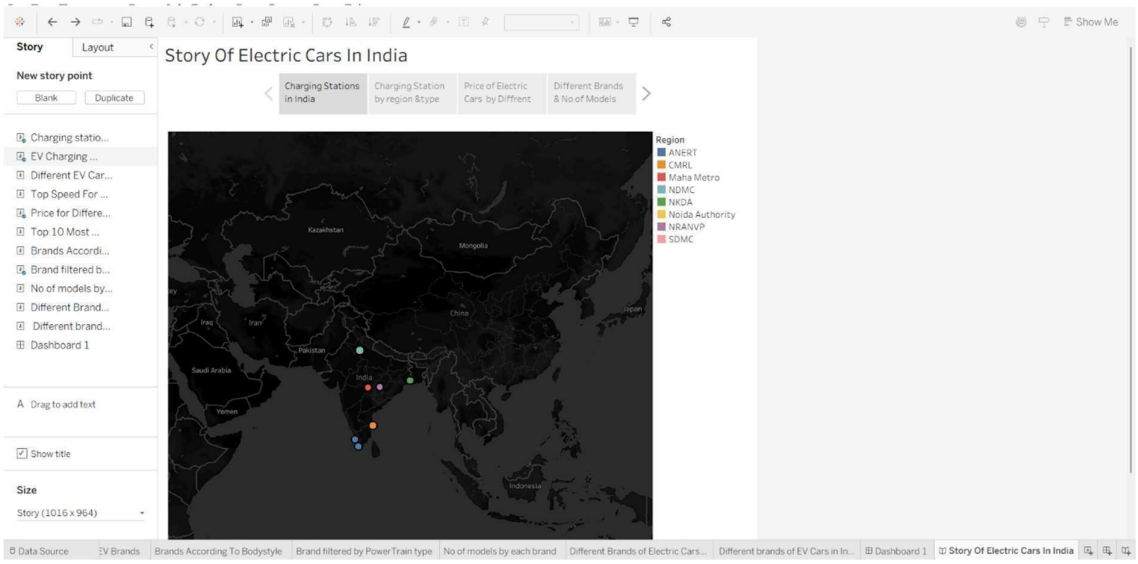
6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Perfomance Testing

S.NO	Parameter	ScreenShots/Values
1	**Data Rendered**	Rendered from CSV datasets including **EV_Specifications.csv, Charging_Stations_Data.csv, Brand_Performance.csv,andEV_Regional_Distribution.csv**, containing EV car specifications, charging infrastructure details, brand performance insights, efficiency metrics, pricing information, powertrain types, and regional distribution (1000+ records including vehicle and station data).
2	**Data Preprocessing**	Processed and transformed raw data from **EV_Specifications.csv, Charging_Stations_Data.csv, Brand_Performance.csv, and EV_Regional_Distribution.csv** using Tableau by handling missing values, correcting data types, standardizing formats, and organizing attributes such as price, range, brand, body style, and region for accurate analysis.
3	**Utilization of Filters**	Interactive filters applied on datasets (**EV_Specifications.csv, Brand_Performance.csv**) across attributes including powertrain type, brand, region, and body style to enable dynamic data exploration and user-driven insights.
4	**Calculation Fields Used**	Calculated fields created using data from **EV_Specifications.csv and Brand_Performance.csv** to derive insights such as average range, efficiency comparisons, vehicle counts per brand, ranking metrics, and aggregated performance indicators.
5	**Dashboard Design**	10 Visualizations are used For EV Analytics Dashboard 1. Charging Stations by region and type in India 2. Summary Cards of Different Brands Of EV Cars Globally 3. Summary Cards of Different Brands Of EV Cars in India 4. Brands according to Bodystyle 5. Top 10 most efficient EV Brands 6.Different EV Cars in india 7.No of Models by Each Brand

7.RESULTS

7.1 Output Screenshots

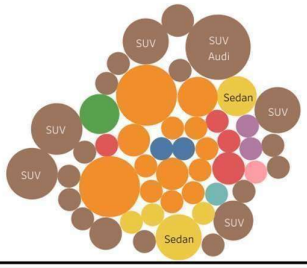

Show Me
Story
Layout
New story point
Blank
Duplicate
Charging statio...
EV Charging ...
Different EV Car...
Top Speed For ...
Price for Differe...
Top 10 Most ...
Brands Accordi...
Brand filtered b...
No of models by...
Different Brand...
Different brand...
Dashboard 1
Drag to add text
Show title
Size
Story (1016 x 964)
Story Of Electric Cars In India
Charging Stations in India
Charging Station by region &type
Price of Electric Cars by Diffrent
Different Brands & No of Models
Region
ANERT
CMRL
Maha Metro
NDMC
NKDA
Noida Authority
NRANVP
SDMC
Kazakhstan
Mongolia
China
Japan
Iraq
Iran
Pakistan
Saudi Arabia
India
Yemen
Indonesia
Data Source
EV Brands
Brands According To Bodystyle
Brand filtered by PowerTrain type
No of models by each brand
Different Brands of Electric Cars...
Different brands of EV Cars in In...
Dashboard 1
Story Of Electric Cars In India

Electric Cars Analytics Dashboard

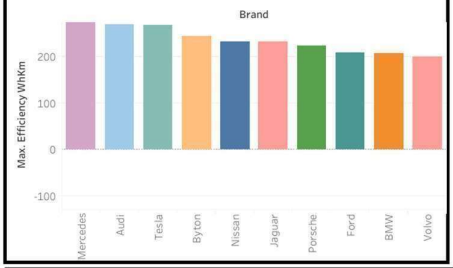
Different Brands of EV Cars Globally
32

Different brands of EV Cars in India
9

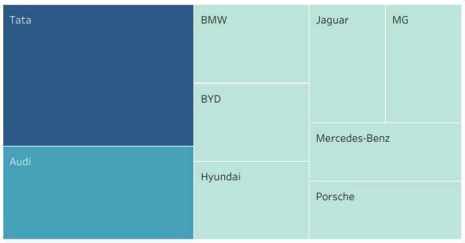
Brands According To Bodystyle



Top 10 Most Efficient EV Brands

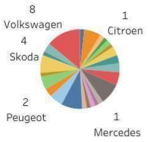


Brand Filtered By PowerTrain Type

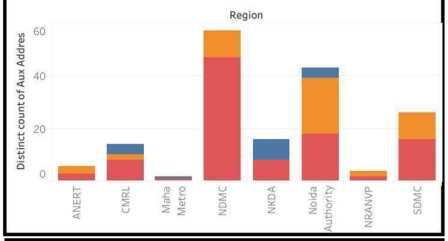


Different EV Cars In India

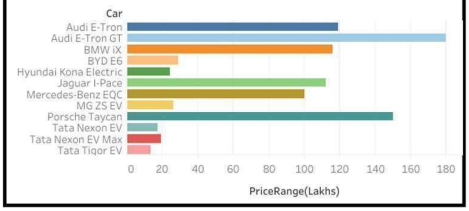
No of models by each brand



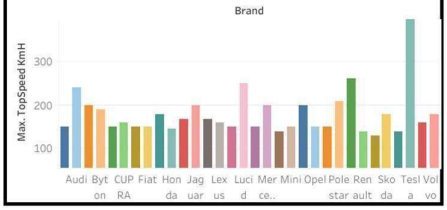
Charging stations By Region And Type In India



Price for Different Cars in India



Top Speed For Different Brands



Body Style
- Cabrio
- Hatchback
- Liftback
- MPV
- Pickup
- Sedan
- SPV
- Station
- SUV

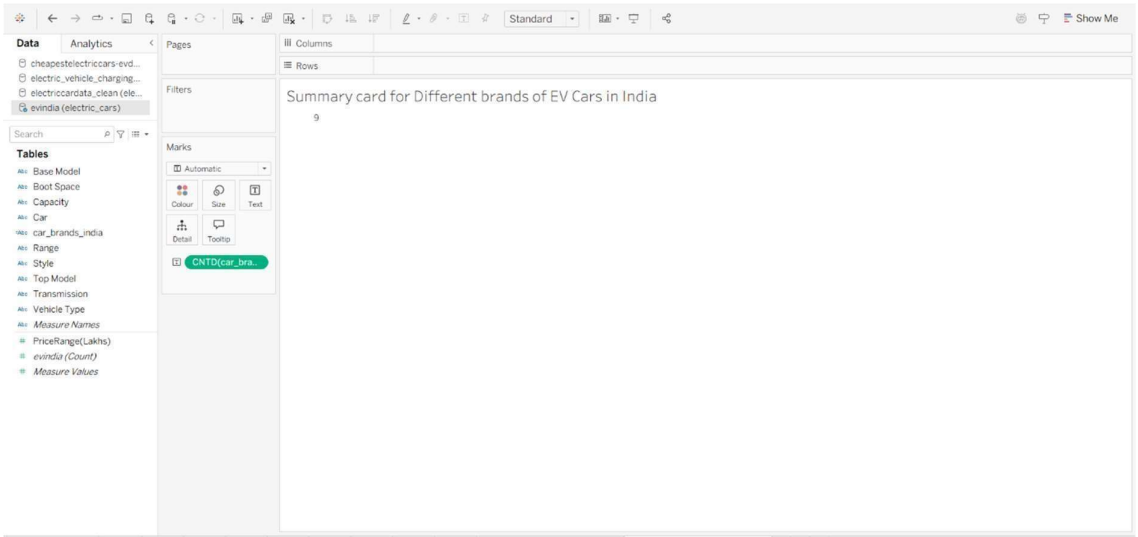
Brand
- Audi
- BMW
- Byton
- Ford
- Jaguar
- Mercedes
- Nissan
- Porsche
- Tesla
- Volvo

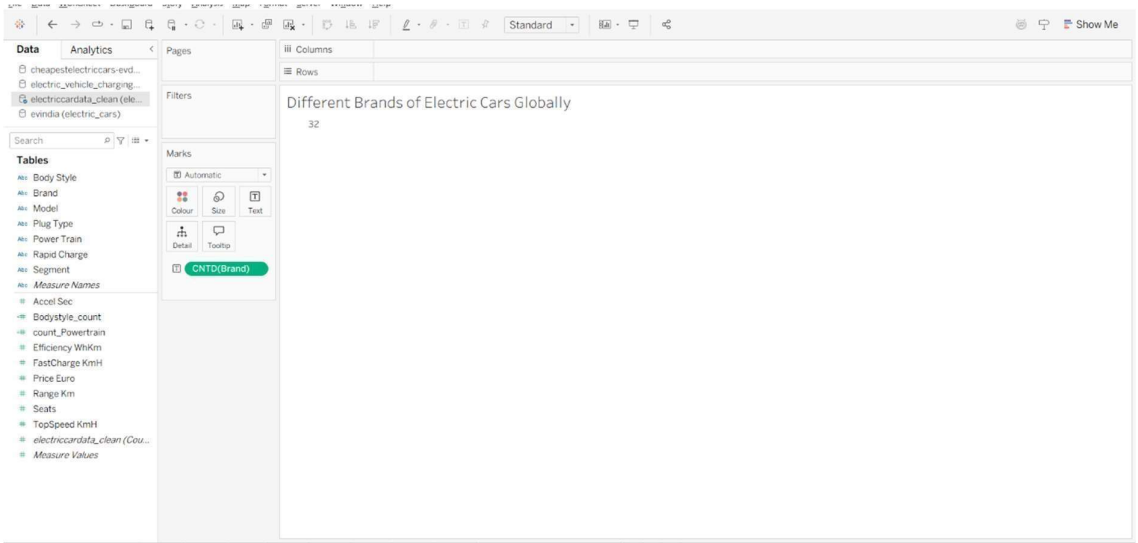
Count of Car
1 — 3

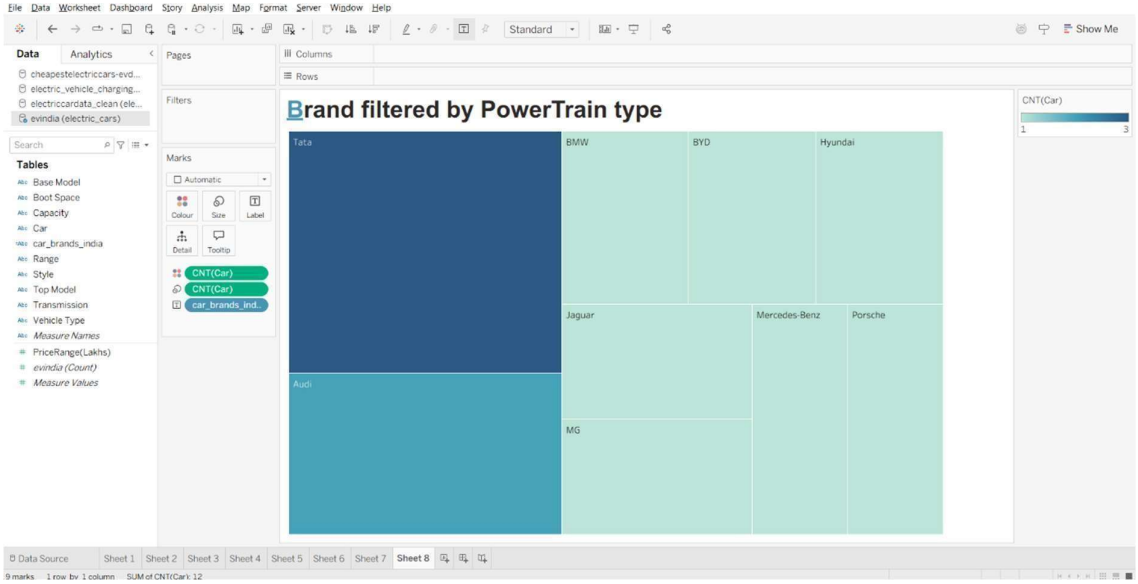
Car
- Audi E-Tron
- Audi E-Tron GT
- BMW iX
- BYD E6
- Hyundai Kona Electr..
- Jaguar I-Pace
- Mercedes-Benz EQC
- MG ZS EV
- Porsche Taycan
- Tata Nexon EV
- Tata Nexon EV Max
- Tata Tigor EV

count_Powertrain
57

Type
- AC-001
- CCS/ChADEMO/ Typ..
- DC-001


Data
Analytics
Pages
Columns
Rows
Filters
Marks
Summary card for Different brands of EV Cars in India
9
Tables
Base Model
Boot Space
Capacity
Car
car_brands_india
Range
Style
Top Model
Transmission
Vehicle Type
Measure Names
PriceRange(Lakhs)
evindia (Count)
Measure Values
CNTD(car_bra...
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5
Sheet 6
Sheet 7
Sheet 8
Sheet 9
Different Brands of Electric Cars...
Summary card for Different br...
1 mark
1 row by 1 column
SUM of CNTD(car_brands_india): 9


Data
Analytics
Pages
Columns
Rows
Filters
Marks
Different Brands of Electric Cars Globally
32
Tables
Body Style
Brand
Model
Plug Type
Power Train
Rapid Charge
Segment
Measure Names
Accel Sec
Bodystyle_count
count_Powertrain
Efficiency WhKm
FastCharge KmH
Price Euro
Range Km
Seats
TopSpeed KmH
electriccardata_clean (Cou...
Measure Values
CNTD(Brand)
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5
Sheet 6
Sheet 7
Sheet 8
Sheet 9
Different Brands of Electric Ca...
1 mark
1 row by 1 column
SUM of CNTD(Brand): 32


File
Data
Worksheet
Dashboard
Story
Analysis
Map
Format
Server
Window
Help
Data
Analytics
Pages
Columns
Rows
Filters
Marks
Brand filtered by PowerTrain type
CNT(Car)
1
3
Tata
BMW
BYD
Hyundai
Jaguar
Mercedes-Benz
Porsche
Audi
MG
Tables
Base Model
Boot Space
Capacity
Car
car_brands_india
Range
Style
Top Model
Transmission
Vehicle Type
Measure Names
PriceRange(Lakhs)
evindia (Count)
Measure Values
CNT(Car)
CNT(Car)
car_brands_ind...
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5
Sheet 6
Sheet 7
Sheet 8
9 marks
1 row by 1 column
SUM of CNT(Car): 12

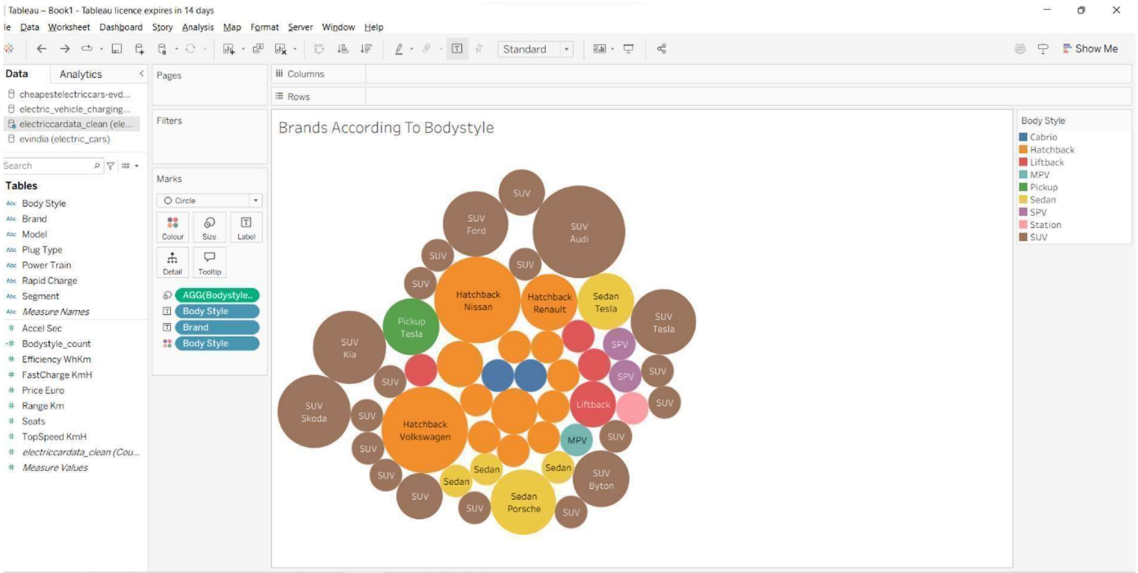


Tableau – Book1 - Tableau licence expires in 14 days
Brands According To Bodystyle
Body Style
Cabrio
Hatchback
Liftback
MPV
Pickup
Sedan
SPV
Station
SUV
Hatchback Nissan
Hatchback Renault
Sedan Tesla
Pickup Tesla
SUV Audi
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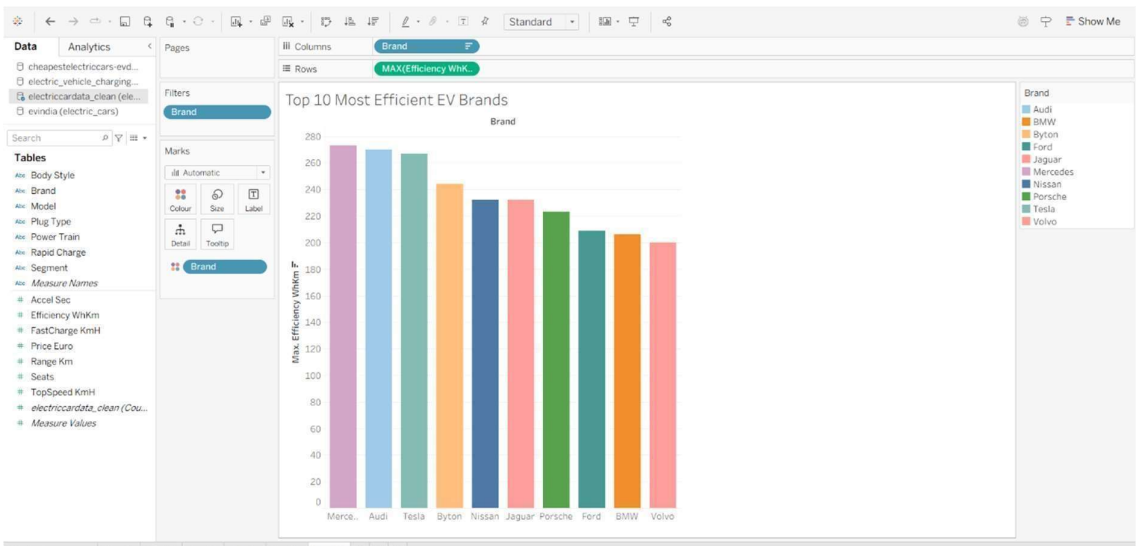
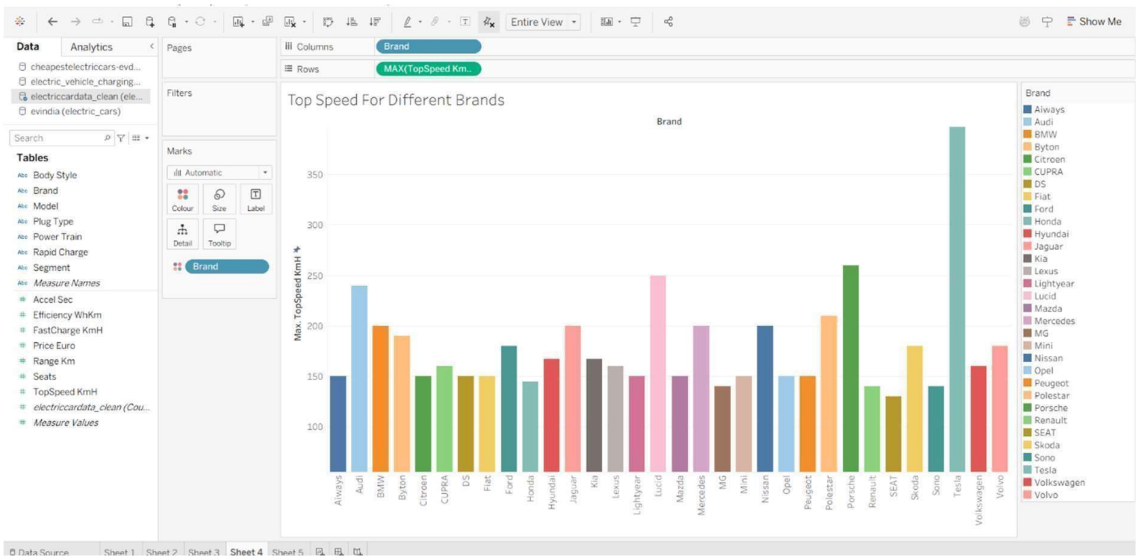
Hatchback Volkswagen
Liftback
MPV
SPV
Sedan
SUV Byton
Sedan Porsche


Top 10 Most Efficient EV Brands
Brand
Max. Efficiency WhKm
Audi
BMW
Byton
Ford
Jaguar
Mercedes
Nissan
Porsche
Tesla
Volvo


Top Speed For Different Brands
Brand
Max. TopSpeed KmH
Aiways
Audi
BMW
Byton
Citroen
CUPRA
DS
Fiat
Ford
Honda
Hyundai
Jaguar
Kia
Lexus
Lightyear
Lucid
Mazda
Mercedes
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Porsche
Renault
SEAT
Skoda
Sono
Tesla
Volkswagen
Volvo

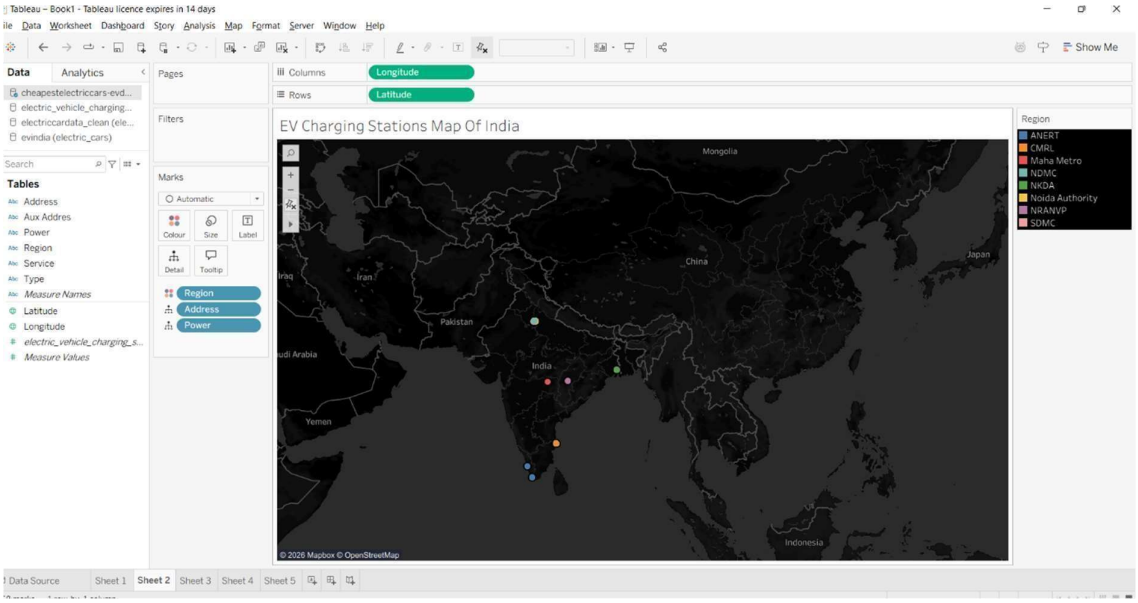


Tableau – Book1 - Tableau licence expires in 14 days
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Show Me
Data
Analytics
Pages
Columns
Longitude
Rows
Latitude
Filters
Marks
Automatic
Colour
Size
Label
Detail
Tooltip
Region
Address
Power
Search
Tables
Address
Aux Addres
Power
Region
Service
Type
Measure Names
Latitude
Longitude
electric_vehicle_charging_s...
Measure Values
EV Charging Stations Map Of India
Region
ANERT
CMRL
Maha Metro
NDMC
NKDA
Noida Authority
NRANVP
SDMC
Mongolia
China
Japan
Iraq
Iran
Pakistan
India
Yemen
Indonesia
© 2026 Mapbox © OpenStreetMap
Data Source
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5

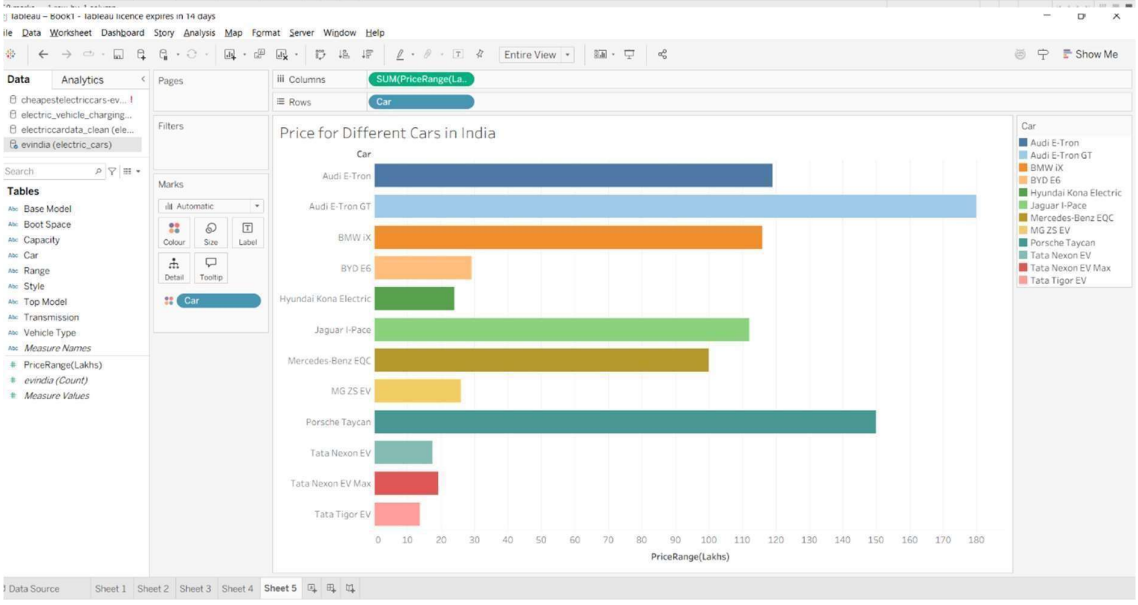
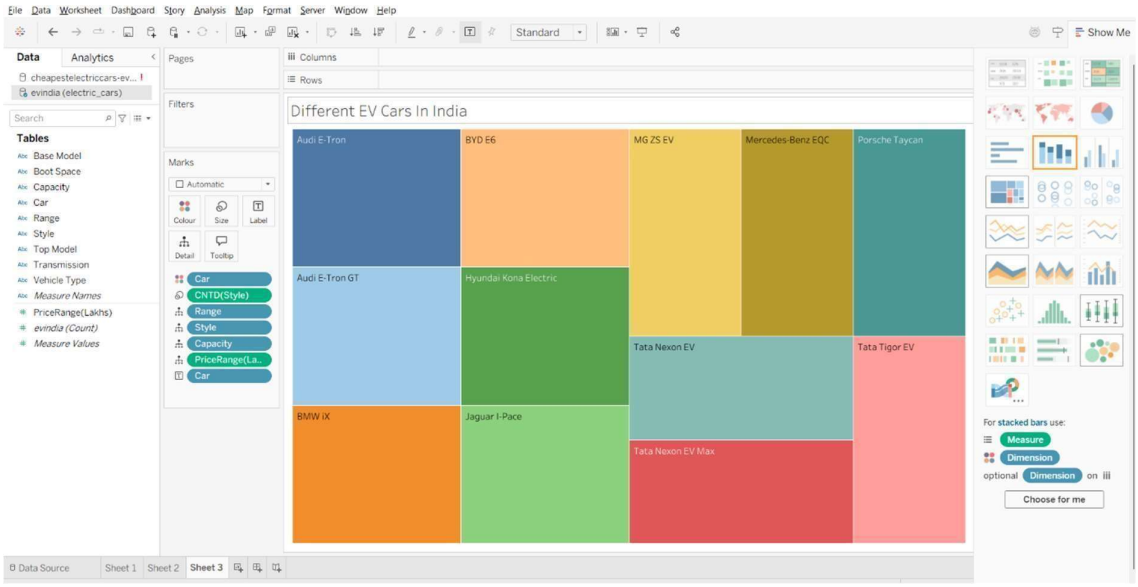
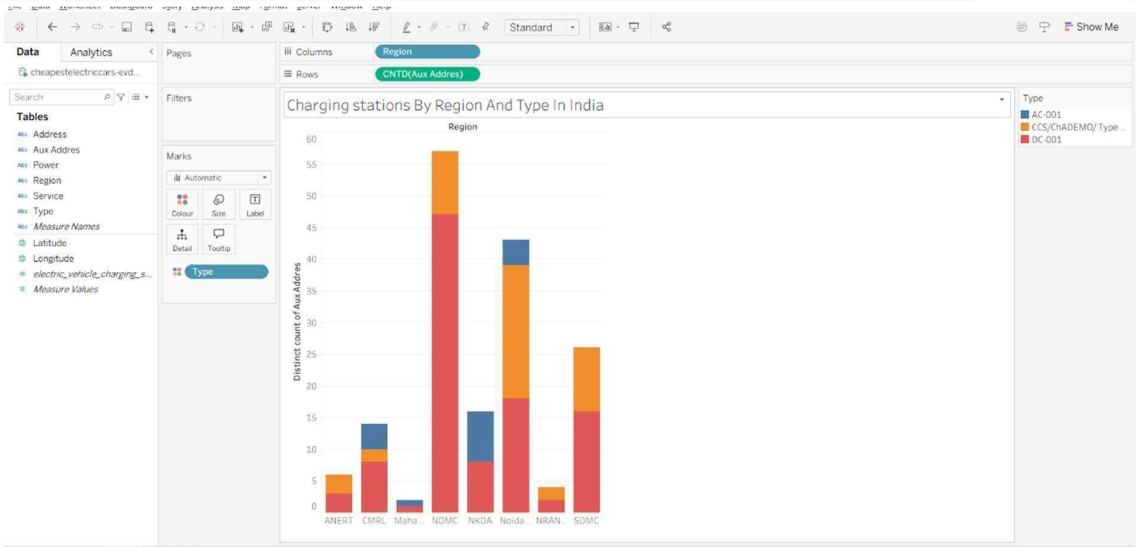
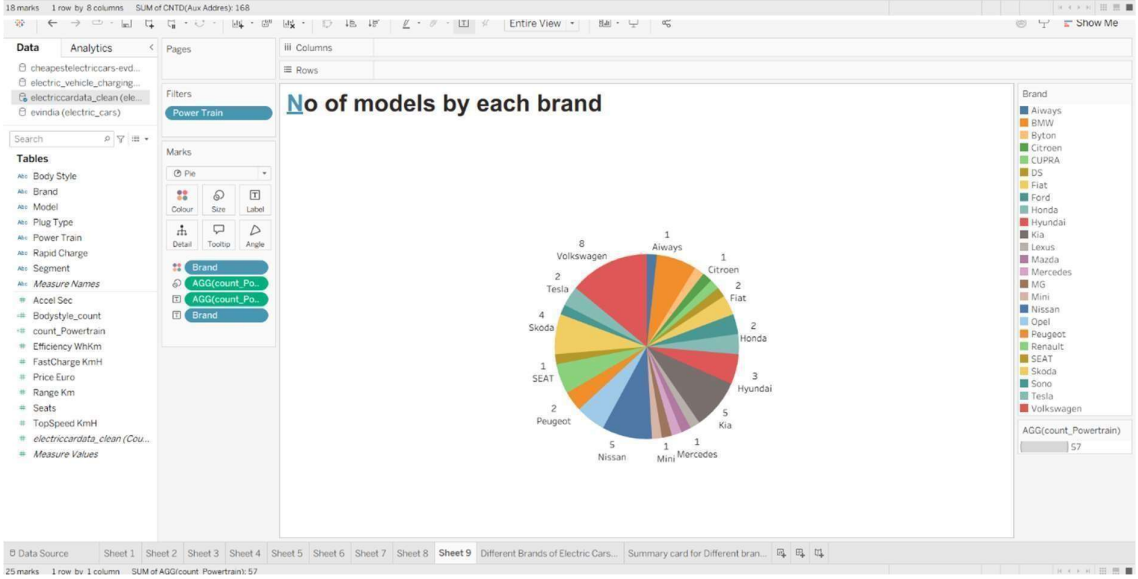


Tableau – Book1 - Tableau licence expires in 14 days
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Entire View
Show Me
Data
Analytics
Pages
Columns
SUM(PriceRange(La...
Rows
Car
Filters
Marks
Automatic
Colour
Size
Label
Detail
Tooltip
Car
Search
Tables
Base Model
Boot Space
Capacity
Car
Range
Style
Top Model
Transmission
Vehicle Type
Measure Names
PriceRange(Lakhs)
evindia (Count)
Measure Values
Price for Different Cars in India
Car
Audi E-Tron
Audi E-Tron GT
BMW iX
BYD E6
Hyundai Kona Electric
Jaguar I-Pace
Mercedes-Benz EQC
MG ZS EV
Porsche Taycan
Tata Nexon EV
Tata Nexon EV Max
Tata Tigor EV
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
PriceRange(Lakhs)
Data Source
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5


Different EV Cars In India
Audi E-Tron
BYD E6
MG ZS EV
Mercedes-Benz EQC
Porsche Taycan
Audi E-Tron GT
Hyundai Kona Electric
Tata Nexon EV
Tata Tigor EV
BMW iX
Jaguar I-Pace
Tata Nexon EV Max


Charging stations By Region And Type In India
Region
Distinct count of Aux Addres
ANERT
CMRL
Maha...
NDMC
NKDA
Noida...
NRAN...
SDMC
Type
AC-001
CCS/ChADEMO/ Type...
DC-001


No of models by each brand
Aiways
Byton
Citroen
CUPRA
DS
Fiat
Ford
Honda
Hyundai
Kia
Lexus
Mazda
Mercedes
MG
Mini
Nissan
Opel
Peugeot
Renault
SEAT
Skoda
Sono
Tesla
Volkswagen
AGG(count_Powertrain)

8.ADVANTAGES&DISADVANTAGES

Advantages of the Project

- Easy Data Understanding

  Visual dashboards make EV data simple to understand

- Interactive Analysis

  Users can apply filters and explore data dynamically

- Accessible Anywhere

  Hosted online → can be accessed from any device

- Saves Time

  No need for manual analysis

- Better Decision Making

  Helps users analyze trends and insights

- User-Friendly Interface Simple website using Bootstrap

- Promotes EV Awareness

  Encourages eco-friendly decisions

Disadvantages of the Project

- Internet Required

  Cannot work without internet connection

- Data Privacy Issues

  Tableau Public makes data visible to everyone

- Limited Customization

  Tableau Public has some feature limitations

- Dependent on Data Quality Wrong data → wrong insights

- No Real-Time Data

  Uses static Excel/CSV data

- Performance Issues (Large Data) May slow down with large datasets

9.CONCLUSION

The Visualization Tool for Electric Vehicle Charge and Range Analysis successfully provides a clear and interactive way to understand key aspects of electric vehicles such as charging time, battery capacity, and driving range. By using Tableau for data visualization, the project transforms raw data into meaningful insights through dashboards and stories. The integration of these visualizations into a web-based interface using HTML, CSS, and Bootstrap improves accessibility and user experience. Overall, the project helps users analyze EV performance e ectively and supports better awareness and decision-making in the adoption of electric vehicles.

10.FUTURE SCOPE

1.Add real-time data instead of static Excel files

2. Use a database for better data storage

3.Develop a mobile app version

4. Add more advanced charts and filters

5.Include global EV data

6.Add user login system

11.APPENDIX

Source code :

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>E-CarStart</title>

  <!-- Bootstrap CSS -->
                                                                    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css"
rel="stylesheet">

  <!-- Custom CSS -->
  <link rel="stylesheet" href="css/style.css">
</head>
<body>

<!-- NAVBAR -->
<nav class="navbar navbar-expand-lg navbar-dark bg-dark fixed-top">
  <div class="container">
    <a class="navbar-brand" href="#">E-CarStart</a>
```

```
   <button class="navbar-toggler" data-bs-toggle="collapse"
databstarget="#menu">
     <span class="navbar-toggler-icon"></span>
   </button>

   <div class="collapse navbar-collapse" id="menu">
     <ul class="navbar-nav ms-auto">
       <li class="nav-item"><a class="nav-link"
href="#dashboard">Dashboard</a></li>
       <li class="nav-item"><a class="nav-link" href="#story">Story</a></li>
     </ul>
   </div>
  </div>
</nav>

<!-- DASHBOARD SECTION -->
<section id="dashboard" class="container my-5">
  <h2 class="mb-3">Dashboard</h2>

  <!-- Dashboard iframe will come here -->
  <iframe
src="https://public.tableau.com/views/SmartBridgeProject_17707335826020/
Dashboard1?:showVizHome=no&publish=yes"     width="100%"
height="700"     frameborder="0"     allowfullscreen>
  </iframe>
</section>

<!-- STORY SECTION -->
```

```
<section id="story" class="container my-5">
  <h2 class="mb-3">Story</h2>

  <!-- Story iframe will come here -->
  <iframe
src="https://public.tableau.com/views/SmartBridgeProject_17707335826020/
StoryOfElectricCarsInIndia?:showVizHome=no&publish=yes"     width="100%"
height="700"     frameborder="0"     allowfullscreen>
  </iframe>
</section>


<!-- Bootstrap JS -->
<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.j
s"></script>


</body>
</html>
```

Github Link

https://github.com/dhana487/Visualization-Tool-for-Electric-VehicleChargeand-Range-Analysis.git

vedio demo

https://drive.google.com/file/d/1OtCUO8EZ_nWfIzzkSFxJ-L4bnlX6pgMu/view?usp=drivesdk