1. INTRODUCTION

1.1 OVERVIEW

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.

1.2 PURPOSE

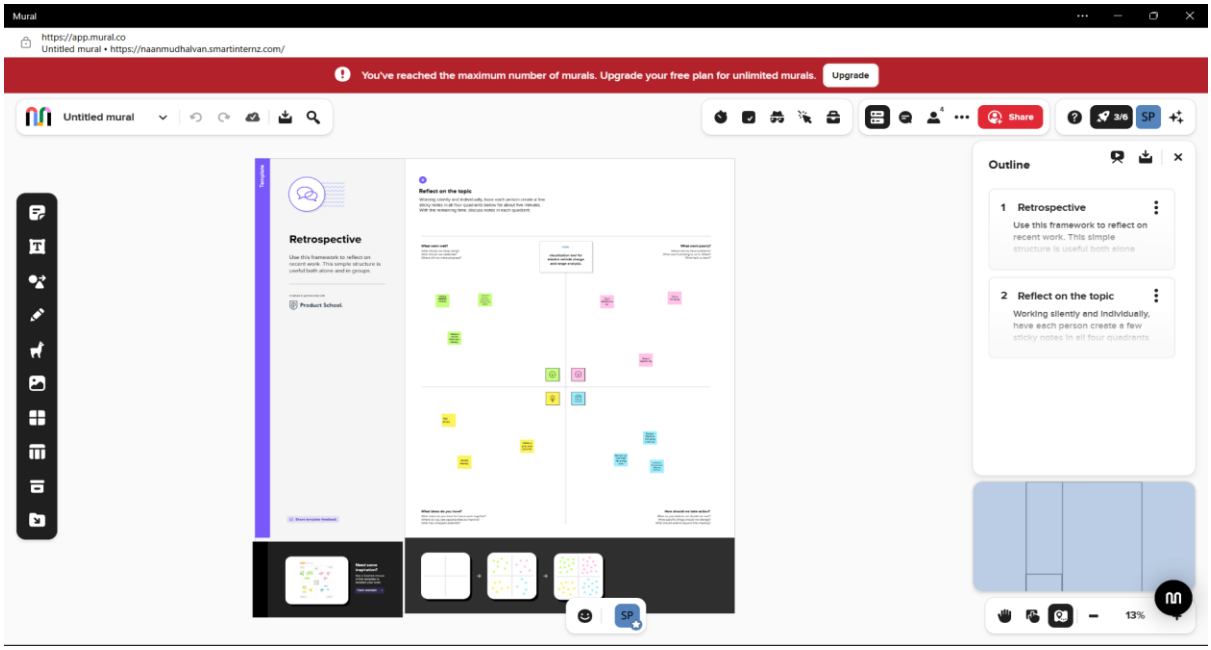
This section presents the real-world charging event log data used in this research. The data was collected from 455 charging stations between January 2014 and November 2019 in Kansas City, Missouri (KCMO). The dataset included a total of 226,652 charging records from 4,921 users. Most of the stations were concentrated in the downtown area of KCMO.

- Charging station information: including a unique station ID, station name, address and zip code where the station was located at, MAC address, latitude and longitude of the station, and type of the charging ports which included level 1, level 2, and DC fast charge

- Electric vehicle attribute: including a unique ID of the electric vehicle and zip code where this electric was registered in (which is usually the zip code of the driver's home)

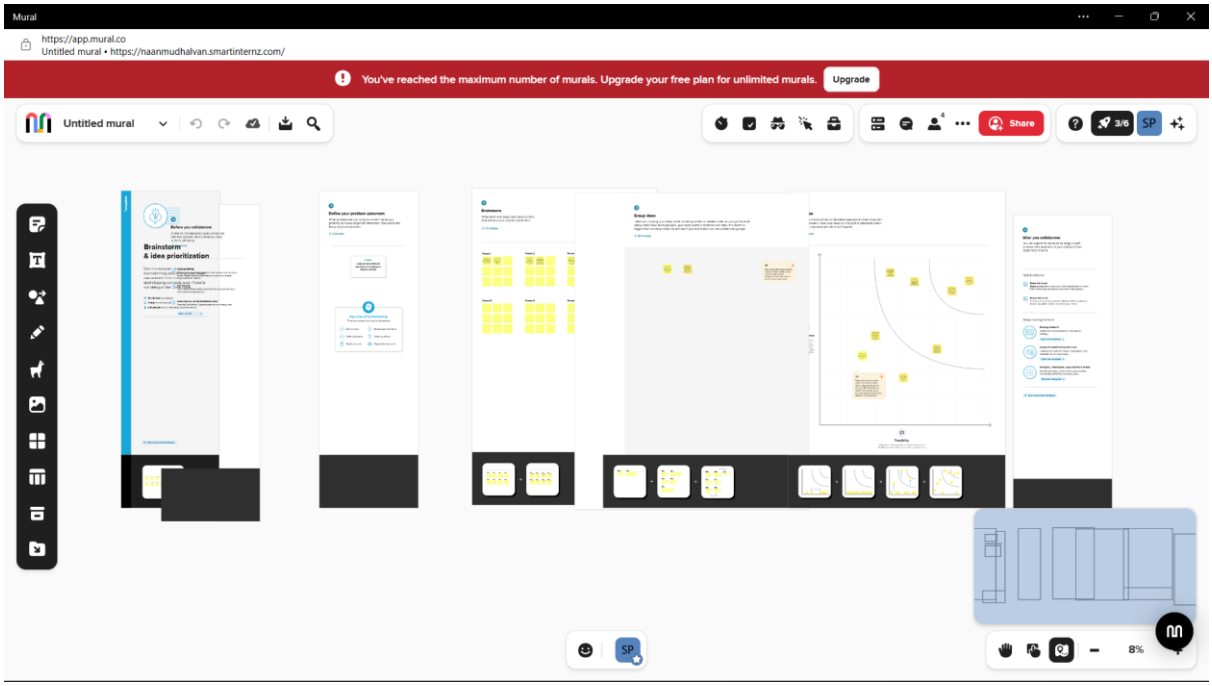
2. PROBLEM DEFINITION & DESIGN THINKING

2.1 Empathy Map



Empathy Map.pdf

2.2 Ideation & Brainstorming Map



Brainstorming Map.pdf

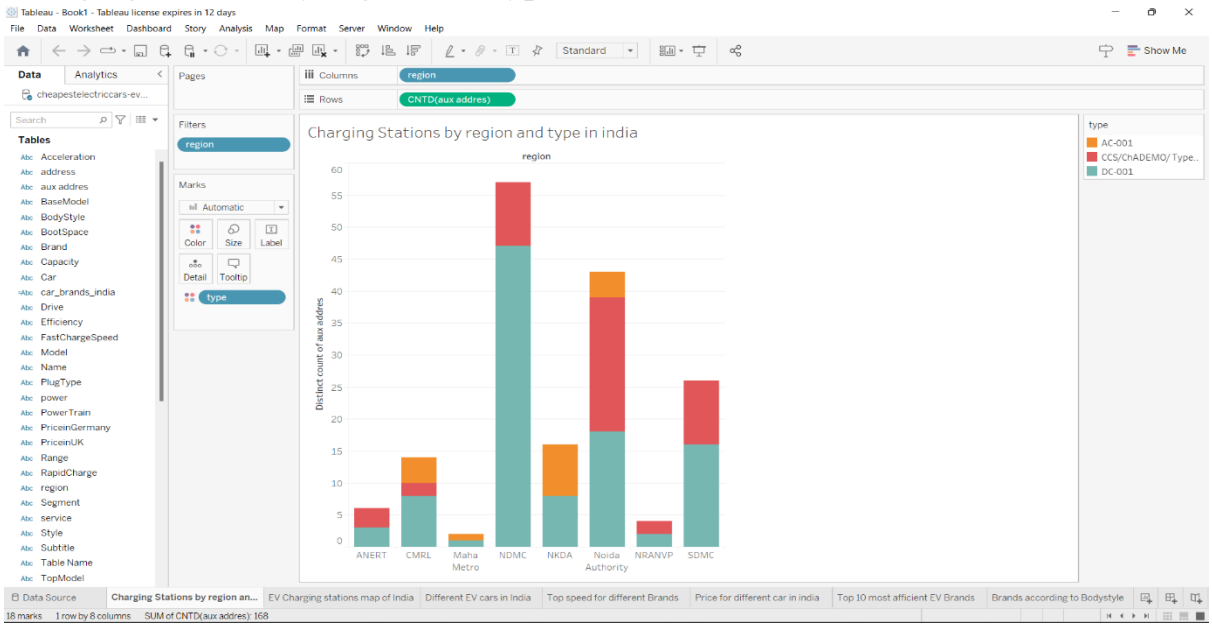
3. RESULT

3.1 Data Model

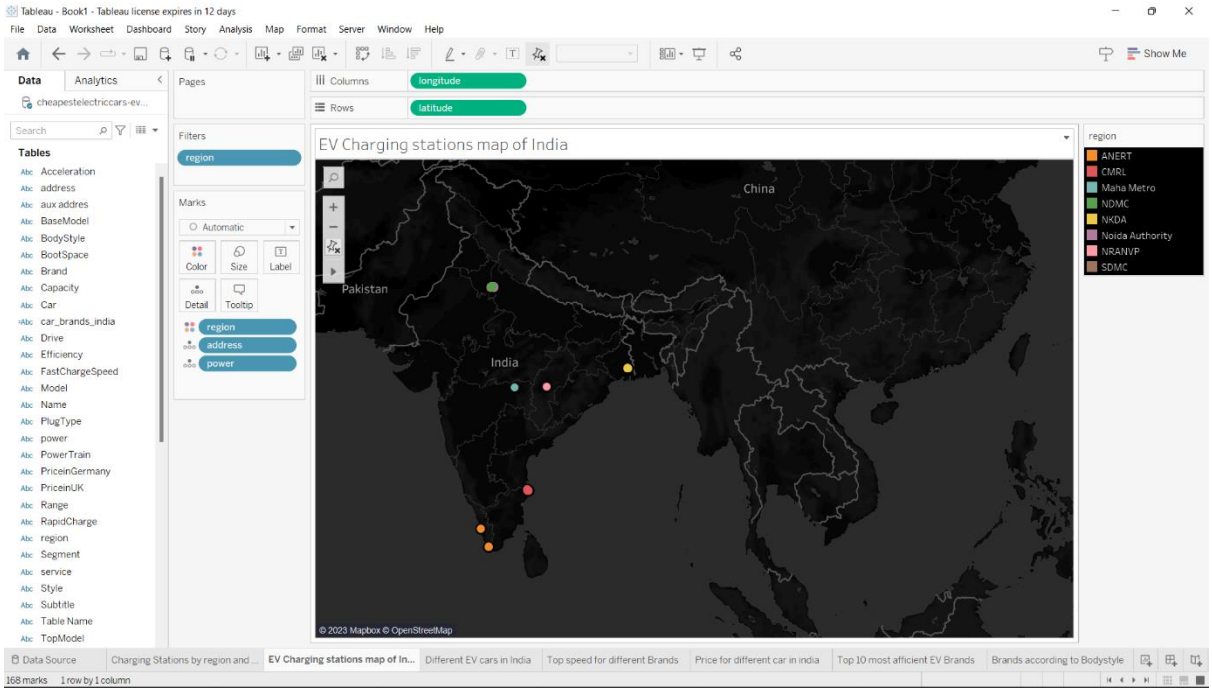
<table>
<tr><td>Object Name</td><td>Fields in the Objects</td></tr>
<tr><td>Vehicles</td><td>
<table>
<tr><td>Field Label</td><td>Data Type</td></tr>
<tr><td>Customer Name</td><td>Text</td></tr>
<tr><td>Customer Mobile No</td><td>Number</td></tr>
<tr><td>Vehicle Type
4-wheeler</td><td>
picklist</td></tr>
<tr><td>4-wheeler
1. Audi
2. Tesla
3. BMW
4. Mercedes
5. Bytom
6. Nissan
7. Jaguar
8. Porsche
9. Ford
10. Volvo</td><td>picklist</td></tr>
<tr><td>Vehicle Name</td><td>Text</td></tr>
<tr><td>Vehicle No</td><td>Text</td></tr>
<tr><td>Chassis No</td><td>Text</td></tr>
<tr><td>Color</td><td>Text</td></tr>
<tr><td>Body Type</td><td>Text</td></tr>
<tr><td>1. Vehicle
2. Fire Extenuation
3. First Aid Kit
4. Multi Charger kit
5. Stereo
6. Tool Kit
7. Tracking Device
8. Tyre Jack</td><td>Multi picklist</td></tr>
<tr><td>Condition
1. Good
2. Medium
3. Least</td><td>picklist</td></tr>
</table>
</td></tr>
</table>

3.2 Activity & Screenshot

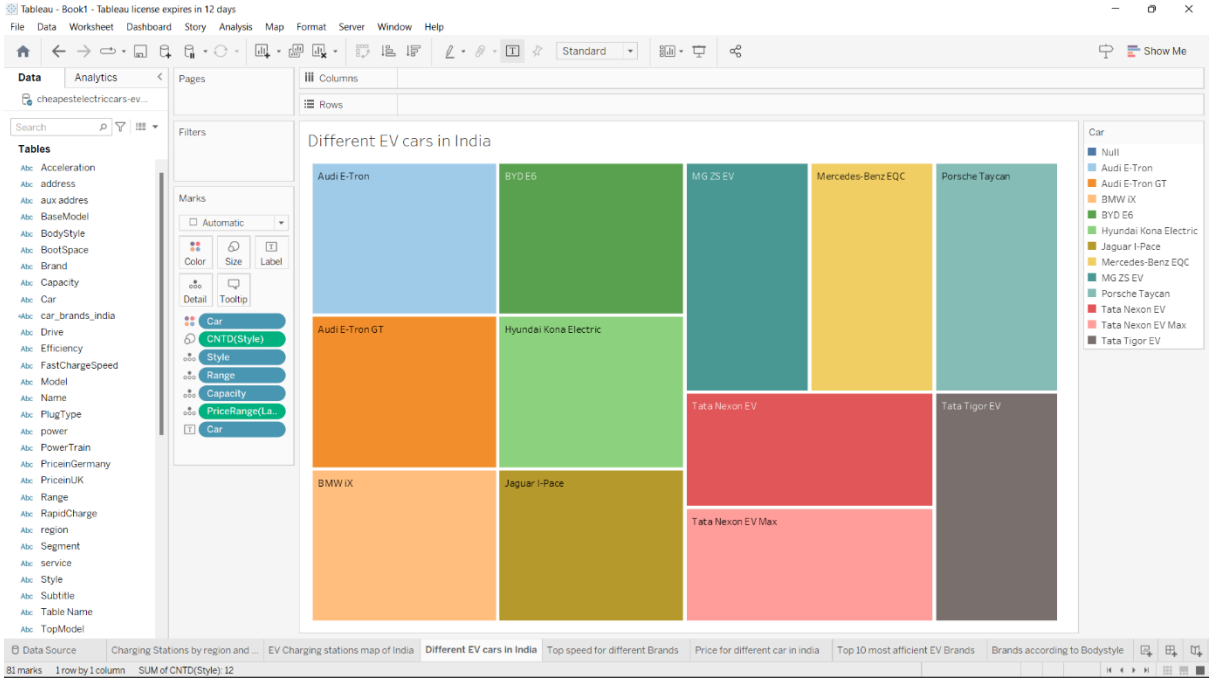
Charging Stations by region and type in india



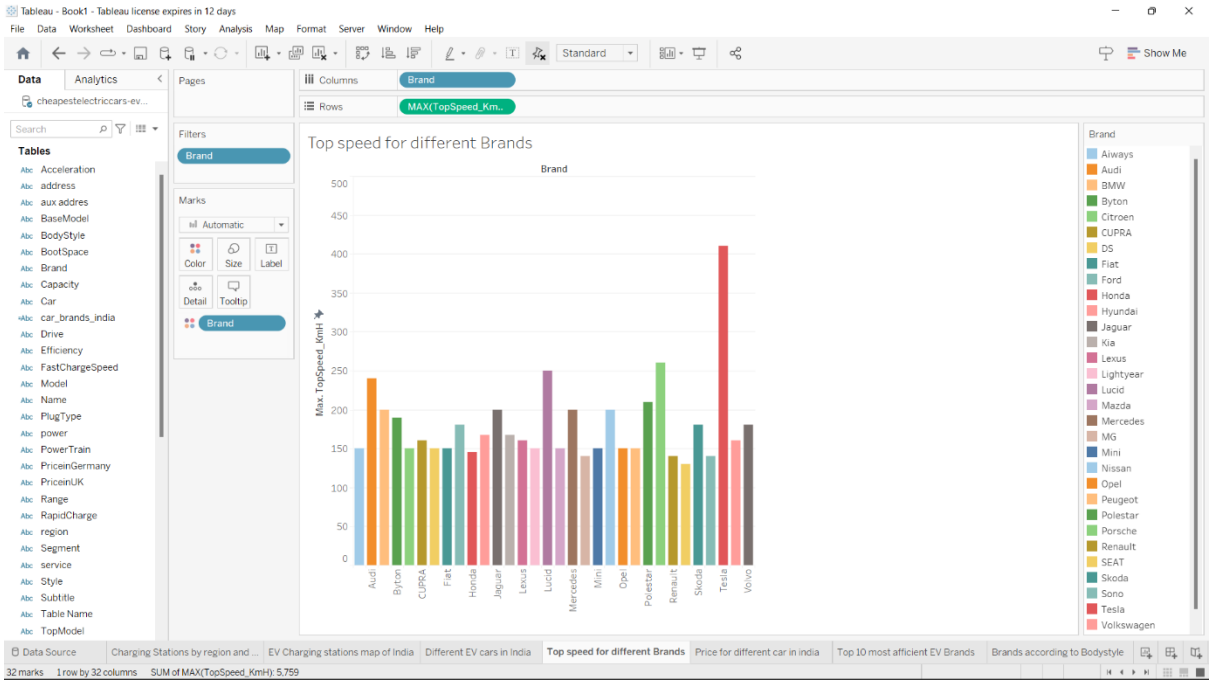
EV Charging stations map of India



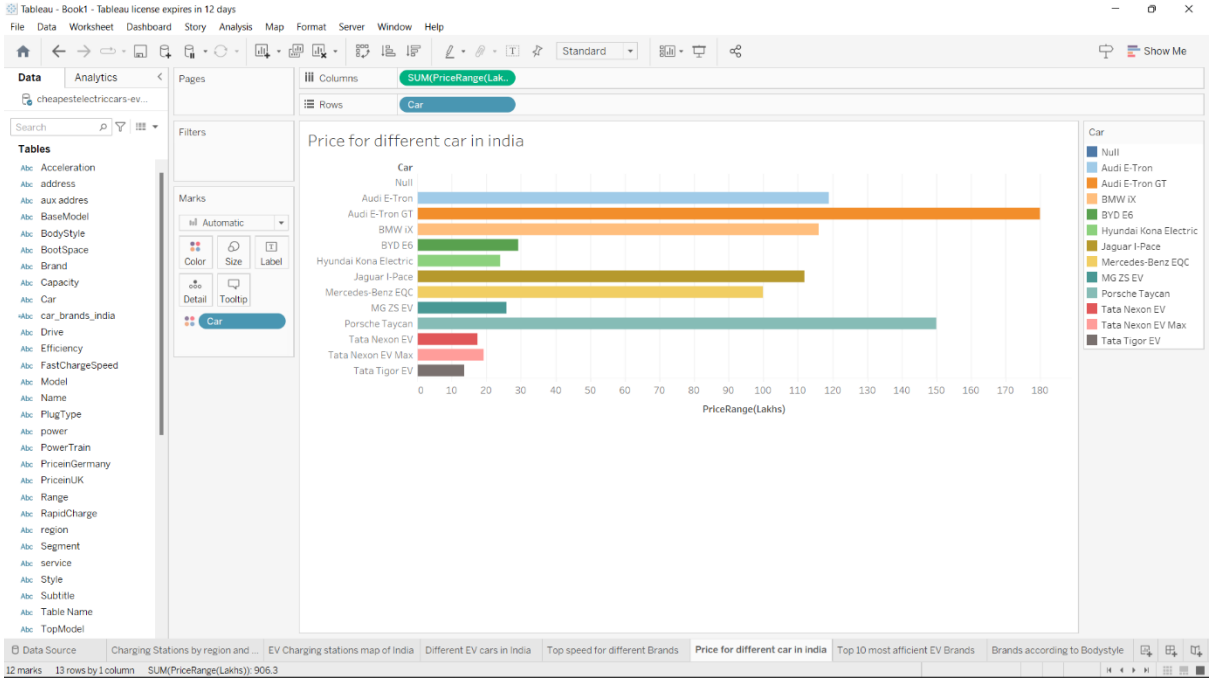
Different EV cars in India



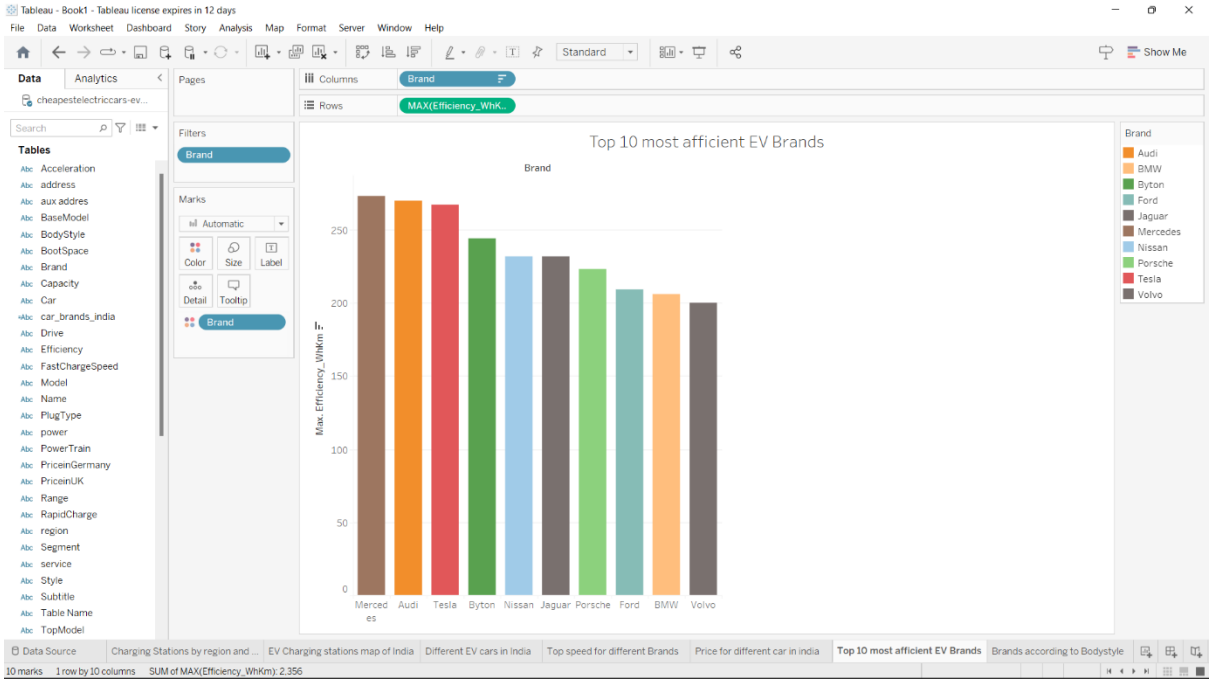
Top speed for different Brands



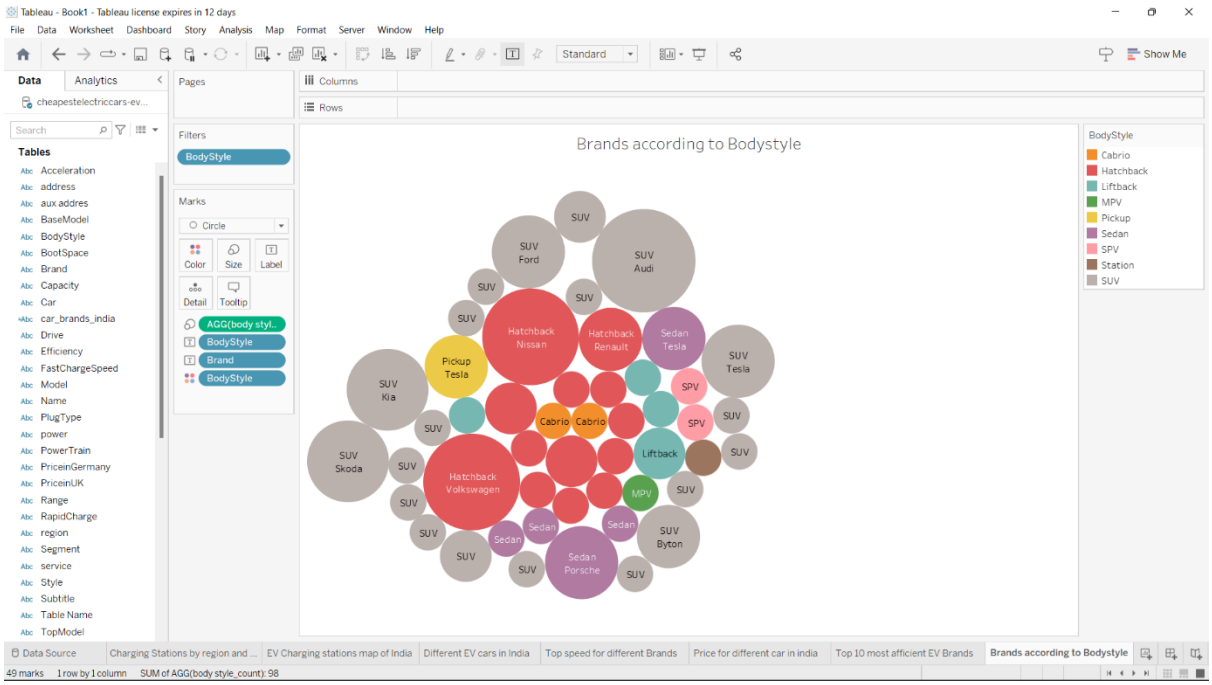
Price for different car in india



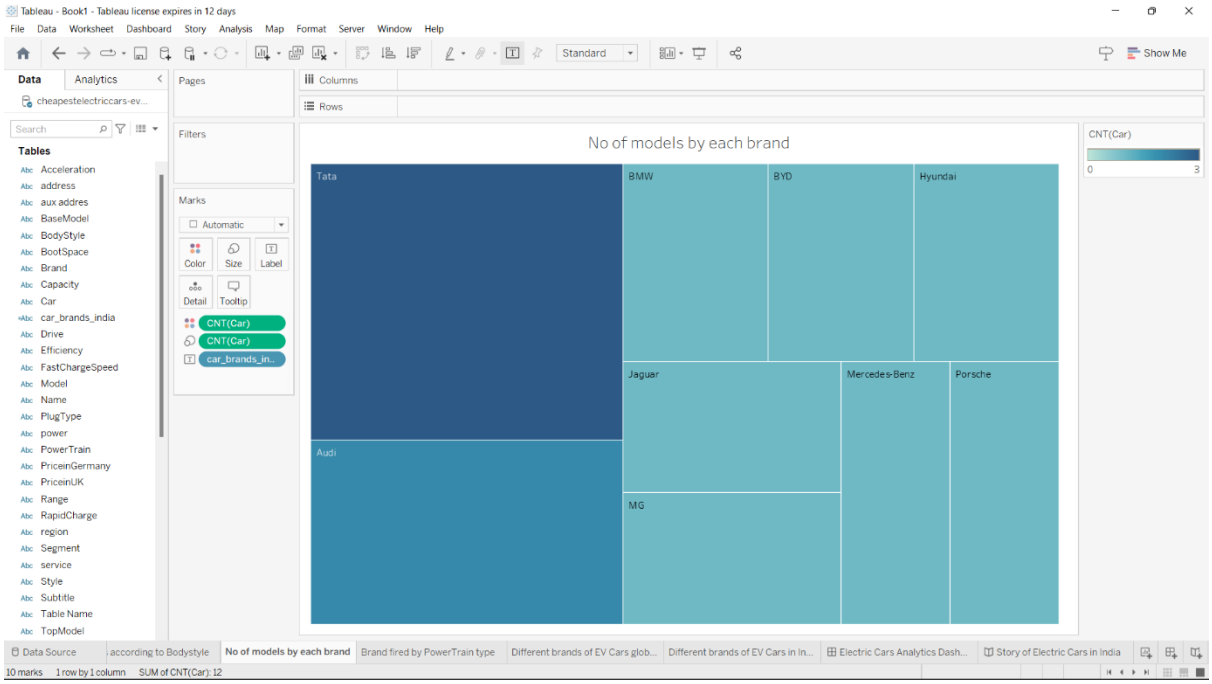
Top 10 most afficient EV Brands



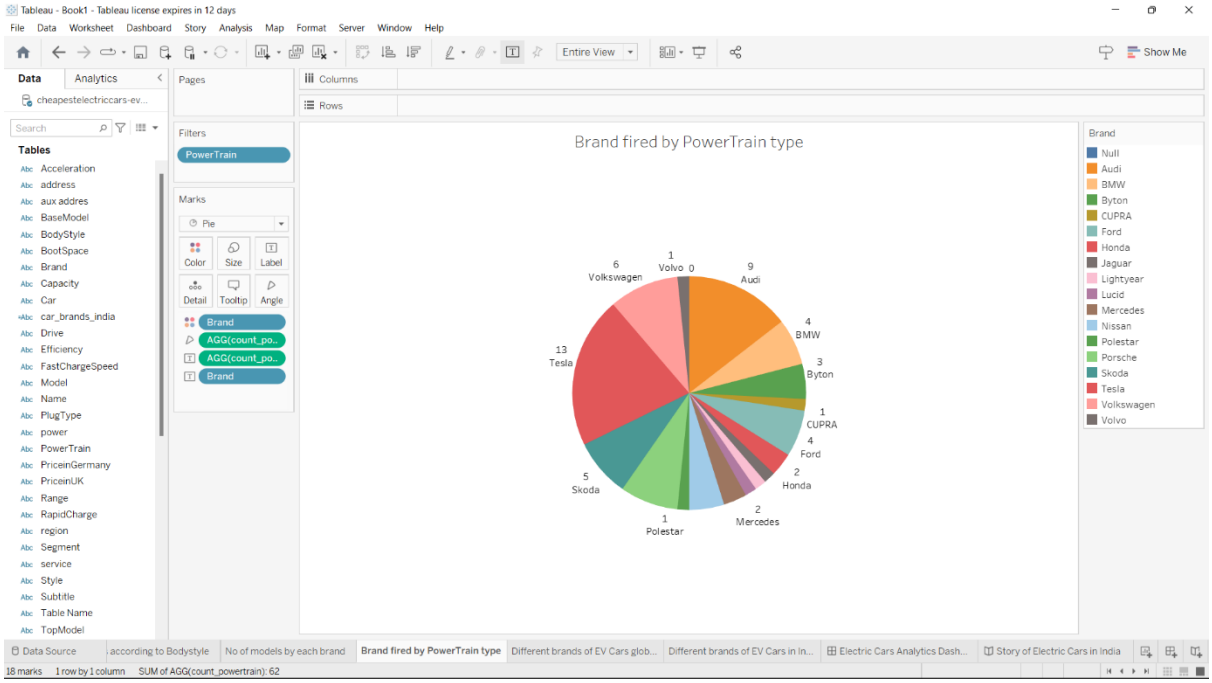
Brands according to Bodystyle



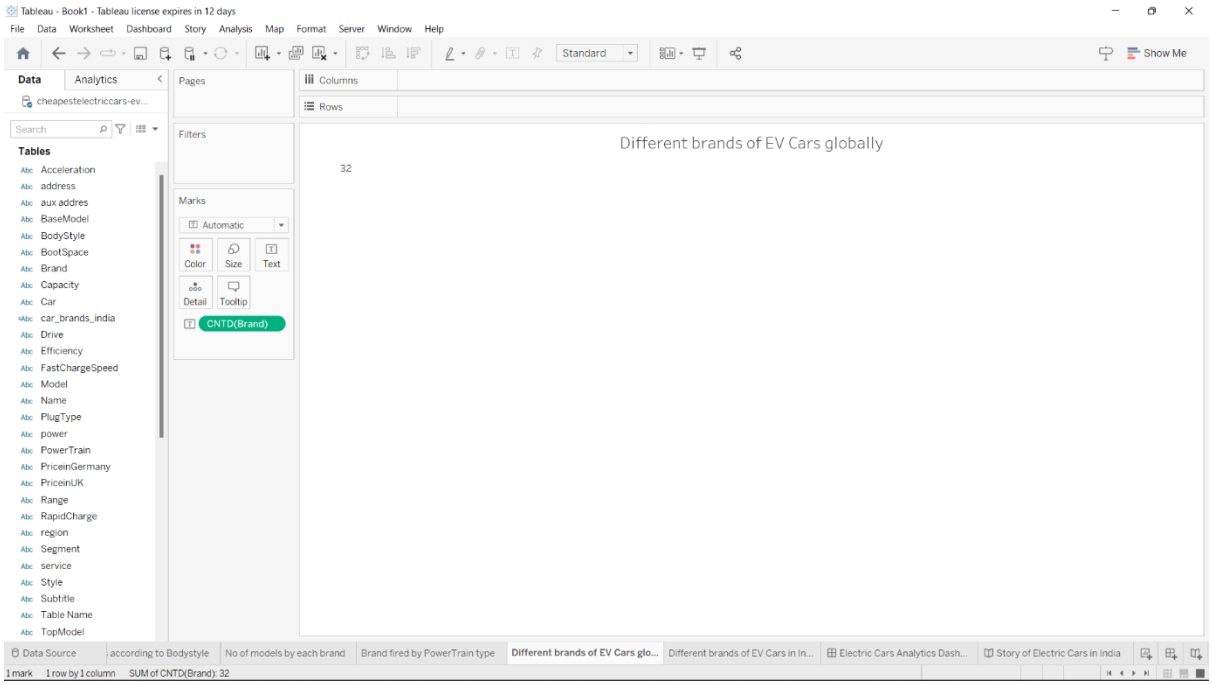
No of models by each brand



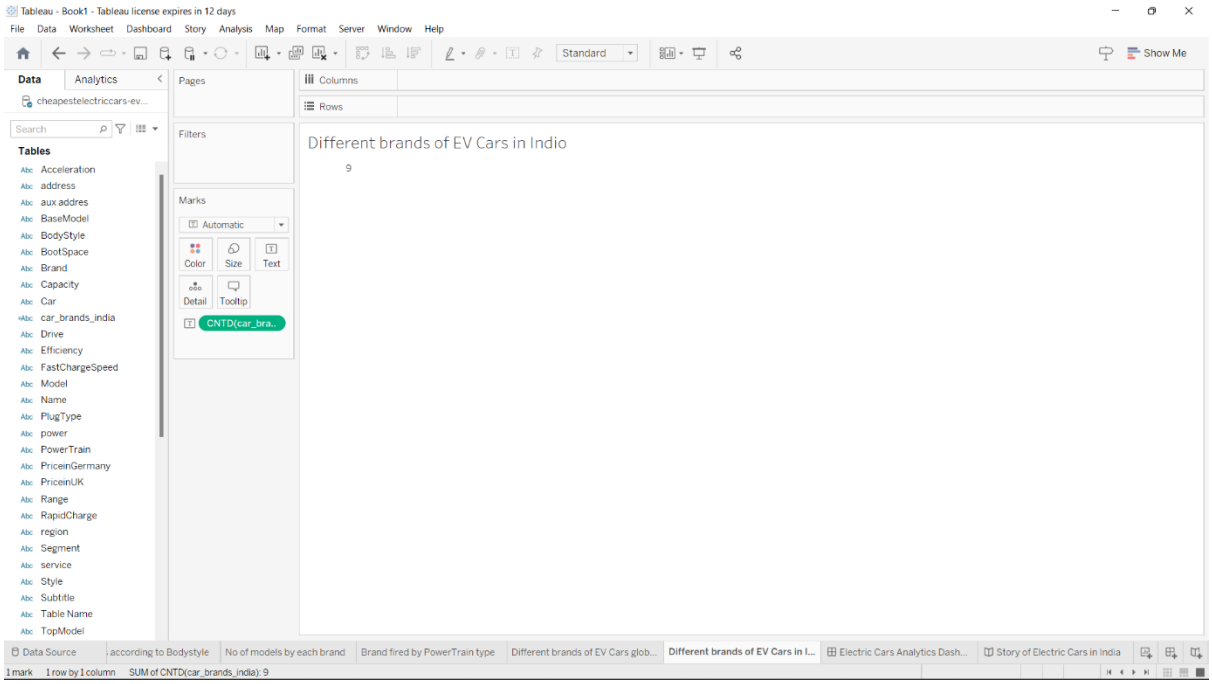
Brand fired by PowerTrain type



Different brands of EV Cars global



Different brands of EV Cars in Indio



4. ADVANTAGES AND DISADVANTAGES

4.1 ADVANTAGES

• One of the best advantages of using the EV is it saves the environment to be polluted from the fossil fuels. With the increase in the population and their desires which is causing global warming can be reduced with the EV.
• More quiet
• Cheaper and easy to charge.
• Best speed experience

4.2 DISADVANTAGES

• It consumes time depending on the charger source is used.
• The unavailability of the required charging stations in India.
• It’s expensive
• Minimal amount of pollution

5.APPLICATION

- **Electric Motor**
- **Batteries**
- **Inventers**
- **Wiring and in Charging stations**

6. CONCLUSION

In this manuscript, the focus was placed on analyzing the electric vehicle's usage behavior pattern with a functional data analysis approach, specifically, based on functional principal component analysis. 5-year real-world charging event log data from a total of 455 charging stations in Kansas City, Missouri (KCMO), was used. The daily usage variability, daily energy consumption variability, and station-level usage variability were analyzed, with the goal of providing theoretical support to the EV infrastructure planning and regulation, as well as the power grid load management The different usage patterns associated with charging stations of different land-use types were also analyzed

7. FUTURE SCOPE

According to a joint report by Indian Venture and Alternate Capital Association (IVCA), Induslaw and EY, the number of charging stations is expected to increase to 100,000 units by 2027 to accommodate the increasing demand by nearly 1.4 million EVs expected to be on the roads by then. Technologies like microelectronics essential for fast charging are some of the fields with big potential for start-ups or businesses in the market of DC fast charging stations.

7. APPENDIX

A. SOURCE CODE

DASHBOARD LINK:

https://public.tableau.com/app/profile/sri.devi3515/viz/Book1_16821555076350/ElectricCarsAnalyticsDashboard?publish=yes

STORY LINK:

https://public.tableau.com/app/profile/sri.devi3515/viz/Book1_16821555076350/StoryofElectricCarsinIndia