VISUALIZATION TOOL FOR ELECTRIC VEHICLES CHARGE AND RANGE ANALYSIS

1 INTRODUCTION

The electric vehicle (EV) industry is rapidly growing, with more and more people switching to EVs every year. However, one of the major challenges for EV owners is managing their vehicle's charge and range. With limited charging infrastructure and unpredictable driving conditions, it can be difficult to plan for long trips or daily commutes. This project aims to address this challenge by analyzing and visualizing data related to EV charge and range.

1.1 Overview

The main objective of this project is to analyze and visualize data related to electric vehicle (EV) charge and range management. The project will involve collecting data from various sources such as EV charging stations, vehicle GPS systems, and user surveys. Once the data is collected, it will be cleaned, stored in a MySQL database, and analyzed using SQL queries. Finally, the data will be visualized using Tableau, allowing for the exploration of relationships between different variables.

The project aims to address the challenges faced by EV owners in managing their vehicle's charge and range. By analyzing and visualizing the data, the project aims to provide insights into EV charge and range behavior and help EV owners plan their trips more effectively.

1.2 Purpose

The purpose of this project is to analyze and visualize data related to electric vehicle (EV) charge and range management. The project aims to provide insights into EV charge and range behavior, identify patterns and trends in the data.

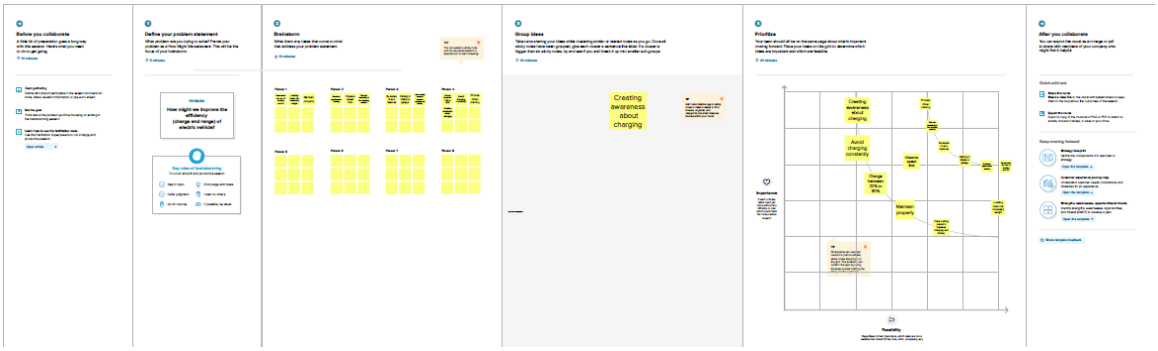
There are several potential uses of this project, including:

- EV owners can use the insights and recommendations generated by this project to plan their trips more effectively, taking into account factors such as charging infrastructure, driving conditions, and vehicle range.
- Government agencies and policymakers can use the project's findings to inform policy decisions related to EV infrastructure, the placement of charging stations.
- Automotive manufacturers and suppliers can use the project's insights to improve their products and services, such as by developing more accurate range estimations or more efficient charging systems.
- Researchers and academics can use the project's data and findings to further their understanding of EV charge and range behavior, and to identify areas for future research.

2 PROBLEM DEFINITION & DESIGN THINKING

2.1 Empathy Map

2.2 Ideation & Brainstroming Map



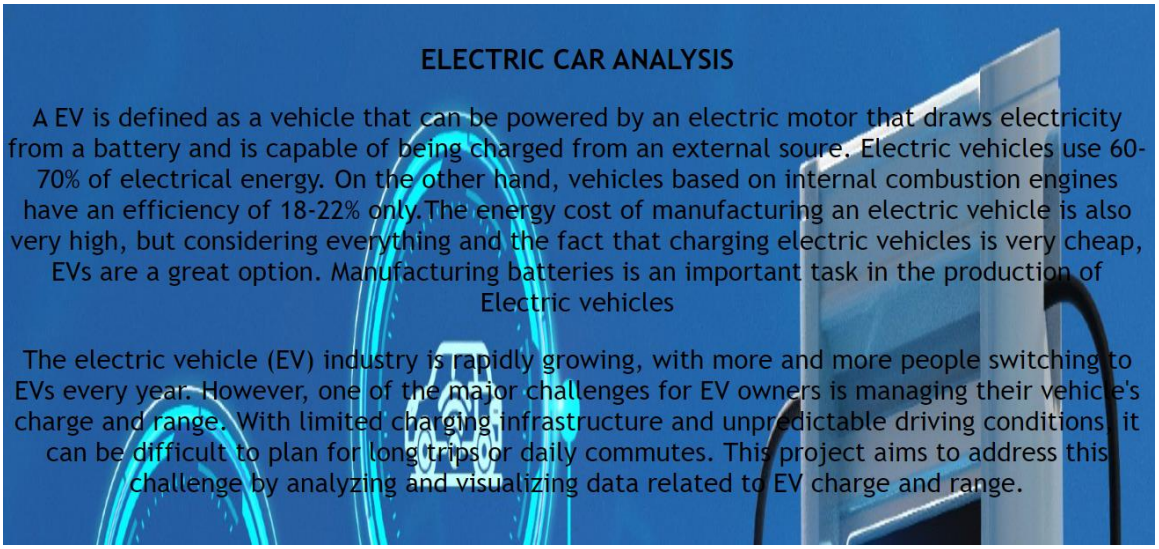
3 RESULT

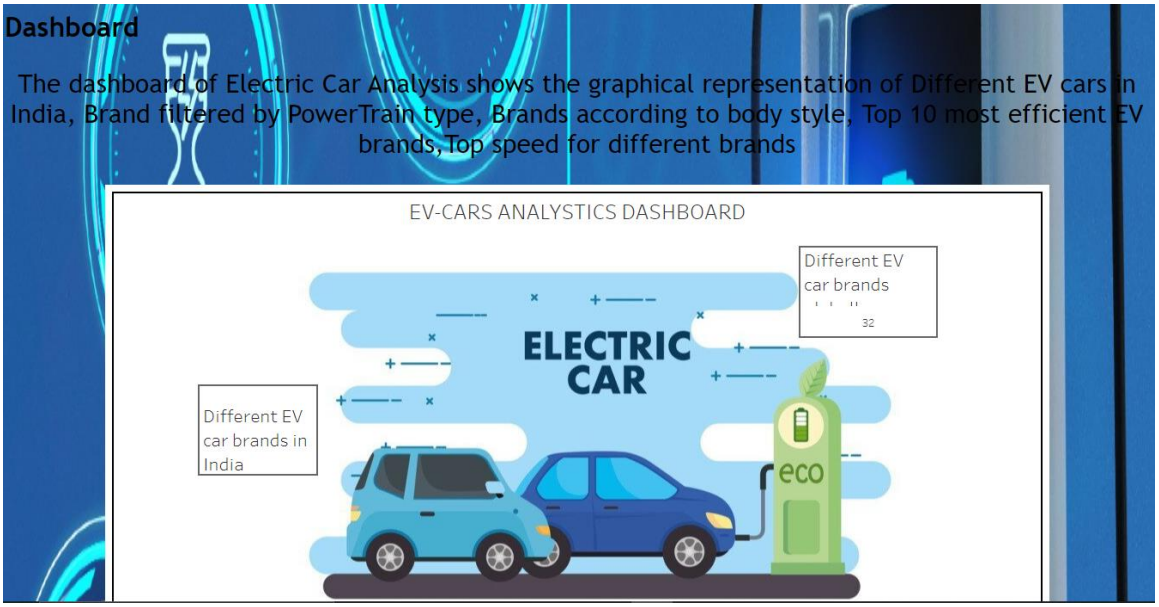
The result of this project is a comprehensive analysis and visualization of data related to electric vehicle (EV) charge and range management, using MySQL and Tableau. The project provides valuable insights into EV charging behavior, including the frequency and the locations of charging stations.

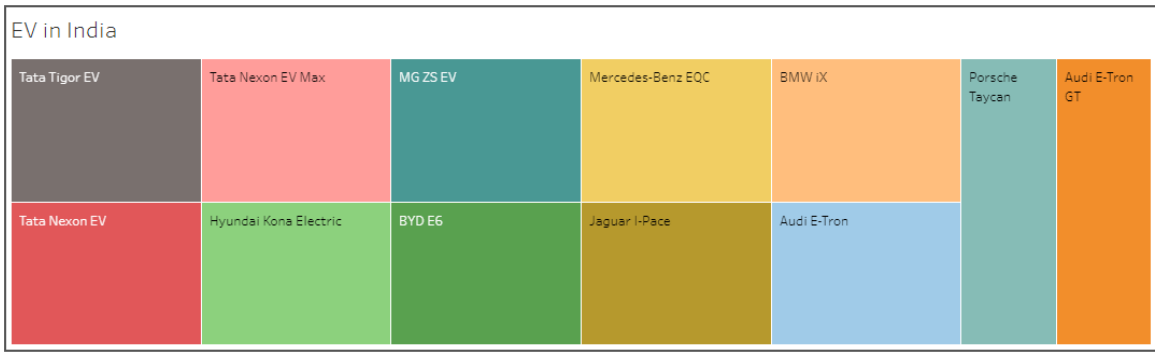
The final findings of this project include:

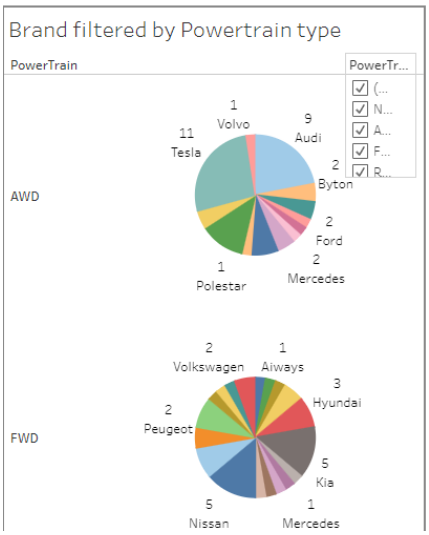
- **Charging behavior:** The project found that EV owners tend to charge their vehicles for shorter durations and more frequently than anticipated, with the majority of charging sessions lasting less than two hours.
- **Charging station locations:** The project identified the locations of charging stations and found that most stations are located in urban areas, with a concentration in areas with high population density and commercial activity.
- **Range anxiety:** The project found that range anxiety is a significant concern for EV owners, with many drivers feeling uncertain about the distance their vehicles can travel before needing to recharge.
- **Planning for longer trips:** The project identified the importance of planning for longer trips by identifying the availability of charging stations along the route and at the destination.

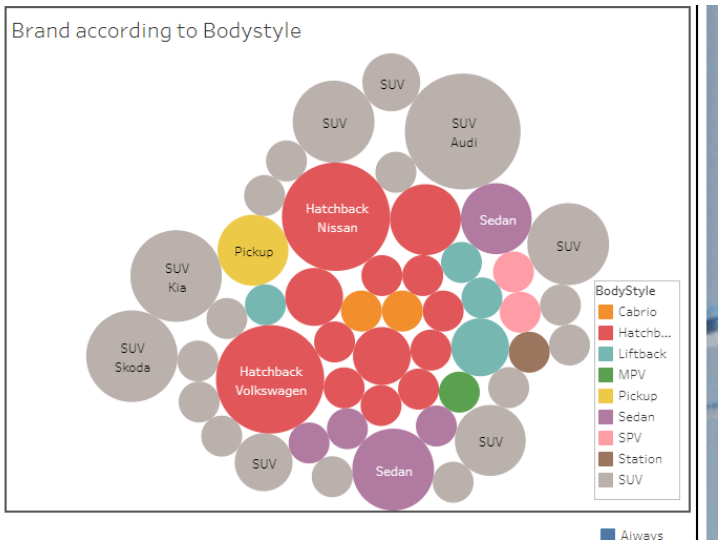
Screenshots








Brand filtered by Powertrain type
PowerTrain
PowerTr...
AWD
FWD
RWD
1 Volvo
9 Audi
11 Tesla
2 Byton
2 Ford
2 Mercedes
1 Polestar
2 Volkswagen
1 Aiways
3 Hyundai
2 Peugeot
5 Kia
5 Nissan
1 Mercedes
6 Volkswagen
4 BMW
1 Byton
1 CUPRA
3 Skoda
2 Honda


Brand according to Bodystyle
SUV
SUV
SUV Audi
Hatchback Nissan
Sedan
SUV
Pickup
SUV Kia
SUV Skoda
Hatchback Volkswagen
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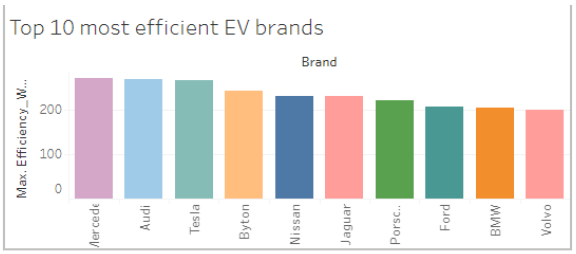
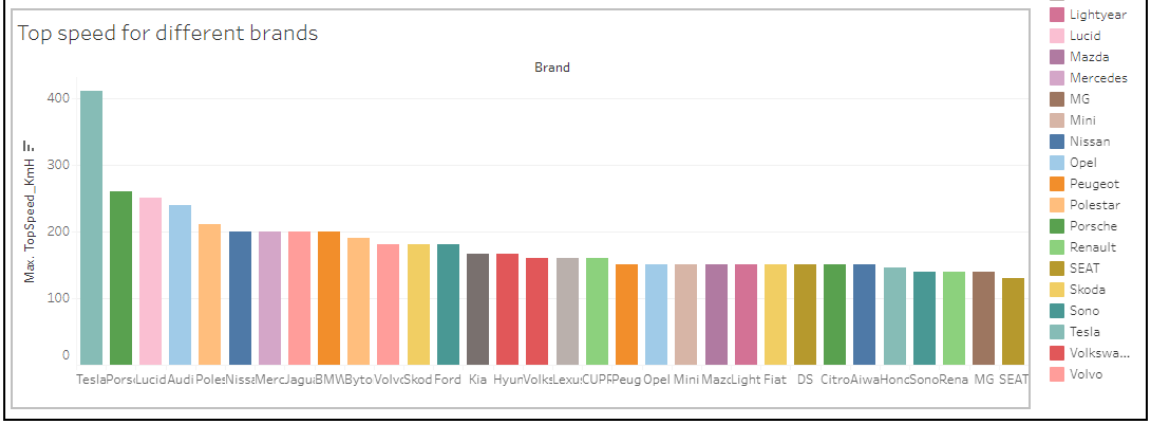
Hatchb...
Liftback
MPV
Pickup
Sedan
SPV
Station
SUV
Aiways


Top 10 most efficient EV brands
Brand
Max. Efficiency_W...
200
100
0
Audi
Tesla
Byton
Nissan
Jaguar
Ford
BMW
Volvo


Top speed for different brands
Brand
Max. TopSpeed_KmH
400
300
200
100
0
Audi
BMW
Byton
Citroen
CUPRA
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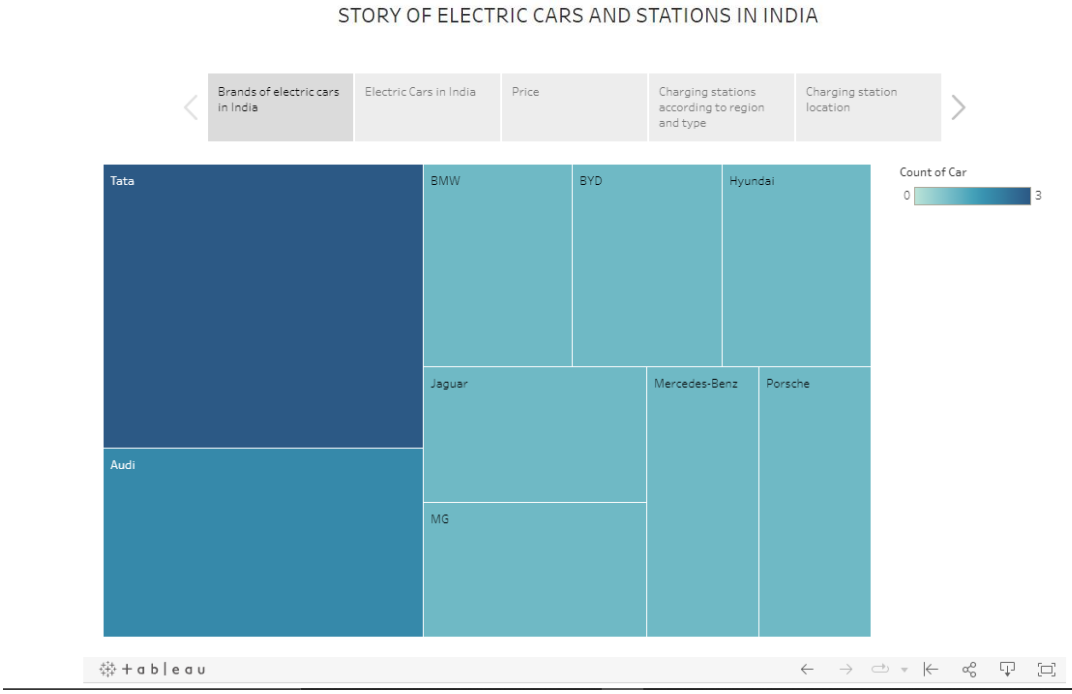
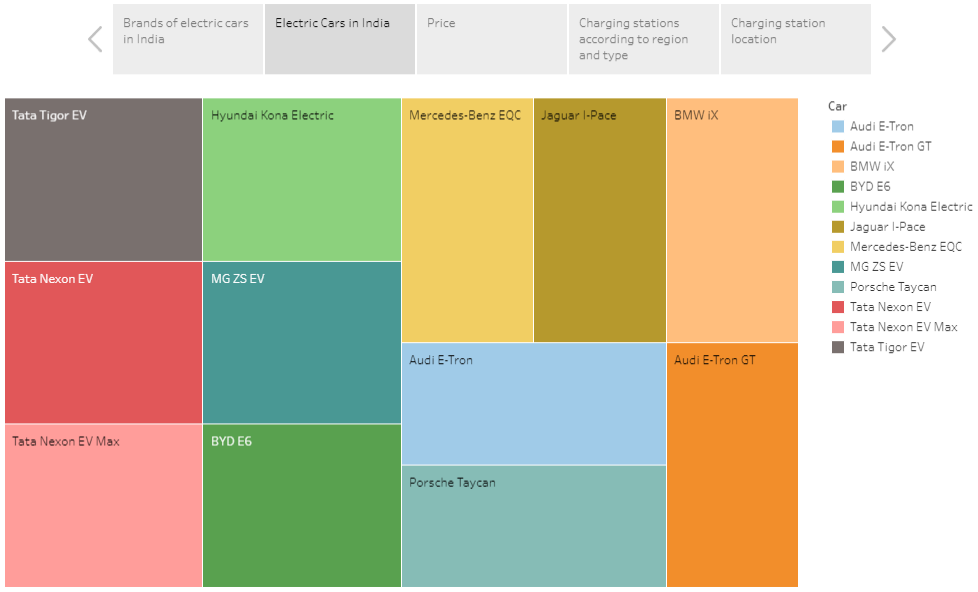
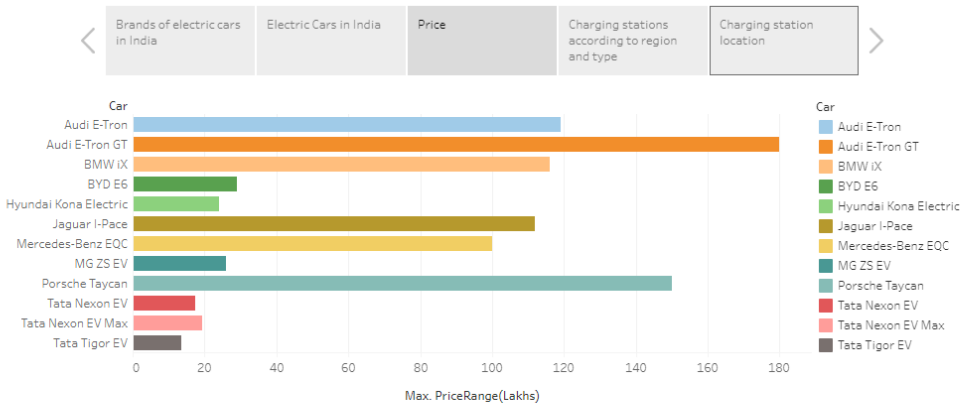
Ford
Honda
Hyundai
Jaguar
Kia
Lexus
Lightyear
Lucid
Mazda
Mercedes
MG
Mini
Nissan
Opel
Peugeot
Polestar
Porsche
Renault
SEAT
Skoda
Sono
Tesla
Volkswa...
Volvo

Story

The Following story represents the visualization of Number of models by each brands, Different EV cars and their prices, Charging stations by region and type and the geographic locations of India






Brands of electric cars in India
Electric Cars in India
Price
Charging stations according to region and type
Charging station location
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
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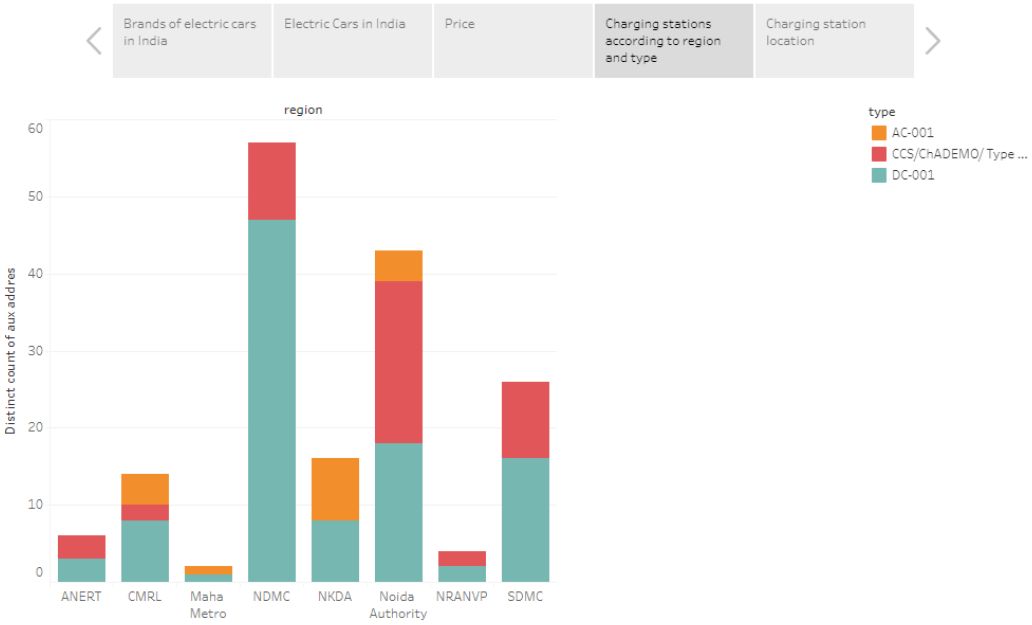
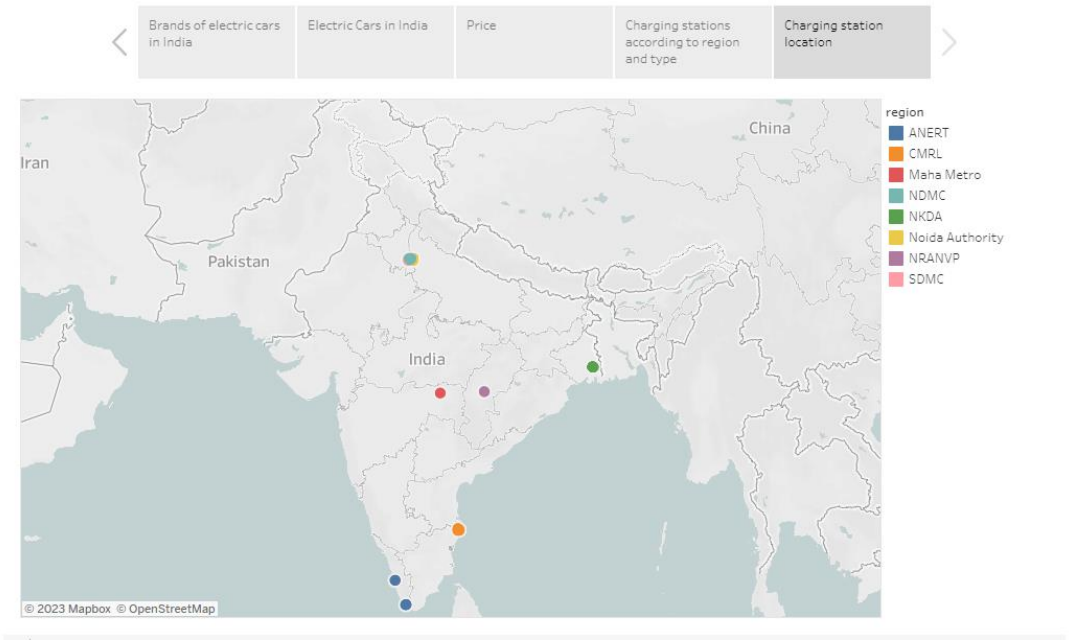
20
40
60
80
100
120
140
160
180
Max. PriceRange(Lakhs)


Brands of electric cars in India
Electric Cars in India
Price
Charging stations according to region and type
Charging station location
region
type
AC-001
CCS/ChADEMO/ Type ...
DC-001
Distinct count of aux addres
60
50
40
30
20
10
0
ANERT
CMRL
Maha Metro
NDMC
NKDA
Noida Authority
NRANVP
SDMC



Created by
Team Leader : Fathima Rakshaana
Team Members : Freda Christy, Abitha, Abisha

4 ADVANTAGES & DISADVANTAGES

Advantages of this project include:

- **Improved trip planning:** By analyzing and visualizing data related to EV charge and range management, the project can provide EV owners with valuable insights that help them plan their trips more effectively, avoiding range anxiety and ensuring that they have adequate access to charging stations.

- **Increased understanding of EV charge and range behavior:** The project can contribute to the overall body of knowledge related to EVs, helping researchers and academics further their understanding of EV charge and range behavior.

However, there are also some potential disadvantages to this project, including:

- **Data limitations:** The accuracy and completeness of the data used in the project may be limited by factors such as data availability and quality.

- **Technical expertise:** The project requires technical expertise in data analysis and visualization tools such as MySQL and Tableau, which may limit its accessibility to individuals or organizations without this expertise.
- **Privacy concerns:** The project involves collecting and analyzing data related to EV charging and driving behavior, which may raise privacy concerns for some individuals.

5 APPLICATIONS

This project can be applied in a variety of areas, including:

- **Urban planning:** The project's insights into EV infrastructure and charging behavior can inform decisions related to urban planning, such as the placement of charging stations and the development of EV-friendly policies and incentives.
- **Transportation:** The project can benefit transportation companies, such as taxi and rideshare services, by providing insights into EV range and charging behavior, which can help them plan routes and ensure their vehicles have adequate access to charging infrastructure.
- **Energy management:** The project's insights into EV charging behavior can inform decisions related to energy management, such as the development of demand response programs that incentivize EV owners to charge their vehicles during off-peak hours.
- **Automotive industry:** The project's insights into EV charging and range behavior can benefit the automotive industry by informing the development of new EV products and services that better meet the needs of EV drivers.

6 CONLUSION

In conclusion, this project focused on analyzing and visualizing data related to electric vehicle (EV) charge and range management using MySQL and Tableau. The project aimed to provide valuable insights that can help EV owners plan their trips more effectively, avoid range anxiety, and ensure adequate access to charging stations. The project's findings can also inform policy decisions related to EV infrastructure and EV products and services, contributing to the overall body of knowledge related to EVs.

The project has several advantages, including improved trip planning, better decision-making, and increased understanding of EV charge and range behavior. However, there are also potential disadvantages, such as data limitations, technical expertise requirements, cost, and privacy concerns.

The project has a wide range of potential applications in areas such as urban planning, transportation, energy management, environmental sustainability, and the automotive industry. Its insights can benefit a variety of stakeholders, including individual EV owners, policymakers, industry professionals, and researchers.

7 FUTURE SCOPE

The future scope of this project is vast, and there are several areas where it can be further developed and expanded. Some potential future directions for this project include:

- **Integration with real-time data:** The project could be expanded to incorporate real-time data from EV charging stations and vehicles, enabling more accurate and up-to-date insights into EV charge and range behavior.
- **Machine learning and predictive modeling:** The project could be enhanced by incorporating machine learning and predictive modeling techniques, enabling more accurate predictions of EV range and charging behavior.
- **Integration with other data sources:** The project could be expanded to incorporate data from other sources, such as weather data, traffic data, and EV sales data, enabling more comprehensive insights into EV usage

patterns.

- **Customization for different regions and vehicle types:** The project could be customized to account for regional differences in EV infrastructure and driving conditions, as well as differences in EV models and types.
- **Mobile application development:** The project could be expanded into a mobile application that provides EV owners with personalized insights and recommendations related to their specific vehicle and driving behavior.

8 APPENDIX

A. Source Code

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    background-size: 100% 100%;
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<title>Visualization tool for electric vehicles charge and range analysis</title>

</head>

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<h1 style="color: black;">ELECTRIC CAR ANALYSIS</h1>

<h2></h2>

 A EV is defined as 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 soure. Electric vehicles use 60-70% of electrical energy. On the other hand, vehicles based on internal combustion engines have an efficiency of 18-22% only.The energy cost of manufacturing an electric vehicle is also very high, but considering everything and the fact that charging electric vehicles is very cheap, EVs are a great option. Manufacturing batteries is an important task in the production of Electric vehicles

 The electric vehicle (EV) industry is rapidly growing, with more and more people switching to EVs every year. However, one of the major challenges for EV owners is managing their vehicle's charge and range. With limited charging infrastructure and unpredictable driving conditions, it can be difficult to plan for long trips or daily commutes. This project aims to address this challenge by analyzing and visualizing data related to EV charge and range. "

<h1 style="color: black;text-align: left;">Dashboard</h1>

 The dashboard of Electric Car Analysis shows the graphical representation of Different EV cars in India, Brand filtered by PowerTrain type, Brands according to body style, Top 10 most efficient EV brands,Top speed for different brands

<noscript><img alt='EV-CARS ANALYSTICS DASHBOARD '

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<h1 style="color: black;text-align: left;">Story</h1>

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</body>

</html>