EV Market

Shreya Satpute

Github- https://github.com/shreyasatpute/EV-Market.git

Problem statement

The Electric Vehicle (EV) Startup team is tasked with conducting an in-depth analysis of the Electric Vehicle market in India to devise a strategic entry plan, focusing on segments most likely to adopt EVs. The aim is to identify suitable vehicle/customer spaces and formulate a feasible strategy considering segmentation analysis. The strategy should encompass a comprehensive understanding of consumer preferences, market dynamics, and regional nuances to effectively position the Electric Vehicle Startup for successful market entry and sustained growth within the burgeoning EV market in India.

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. Electric cars are more preferable. The maintenance cost of electric vehicles is also very low. They are economical to maintain. The energy conversion efficiency of electric vehicles is also high. 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.

Electric vehicles are made for the future and will be a big innovation. They are good for the environment and they do not emit any greenhouse gases.

There are, however, many challenges associated with electric vehicles. They have a limited range. Charging the vehicle takes time and can be a hassle sometimes. The availability of charging stations is also a big issue. Incompatibility of charging stations can also be a problem. Despite many challenges and issues, switching to electric

vehicles is good for the environment and is more economically viable in the long term. Many have predicted that, by 2040, most of the vehicles will be electric. Rising fossil fuel costs and high maintenance costs of petrol and diesel vehicles coupled with environmental concerns are the main reasons. Many developed countries have given incentives for purchasing electric vehicles. Automobile manufacturers are already manufacturing some impressive electric vehicles.

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.

Data Sources

Importing the Dataset: We will import the dataset that we need to use. So here, we are using the Final.csv dataset. It can be imported using the below code

/* df=pd.read_csv("/Cheapestelectriccars-EVDatabasecsv") */

Data Pre-processing:(steps and libraries used)

Importing Libraries: firstly, we will import the libraries for our model, which is part of data pre-processing. The code is given below:

/*import numpy as np

import pandas as pd

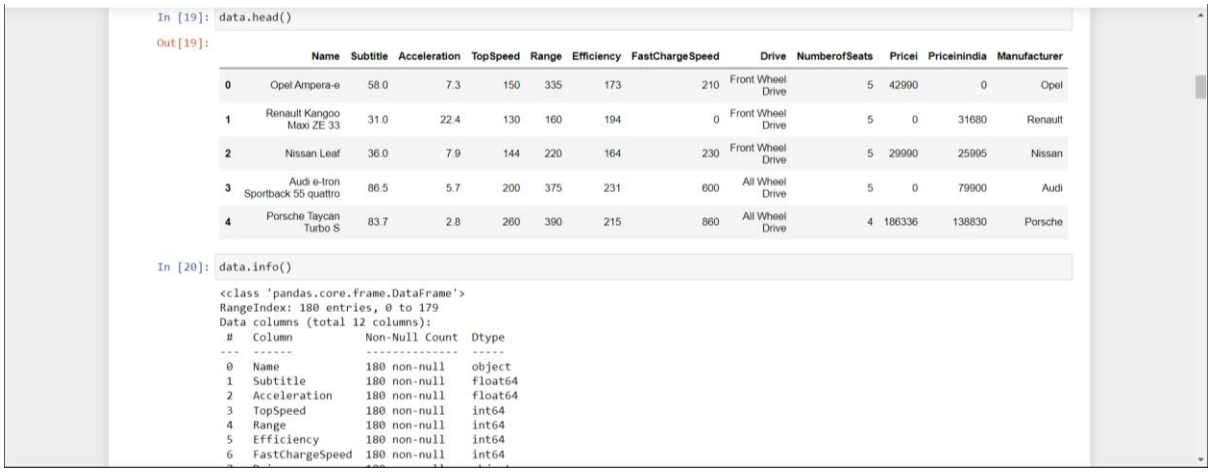
import matplotlib.pyplot as plt

from sklearn.cluster import KMeans */

- Numpy we have imported for the performing mathematics calculation.

- Matplotlib is for plotting the graph, and pandas are for managing the dataset.

- Seaborn is for data visualization library, it is based on matplotlib.



```
In [19]: data.head()
```

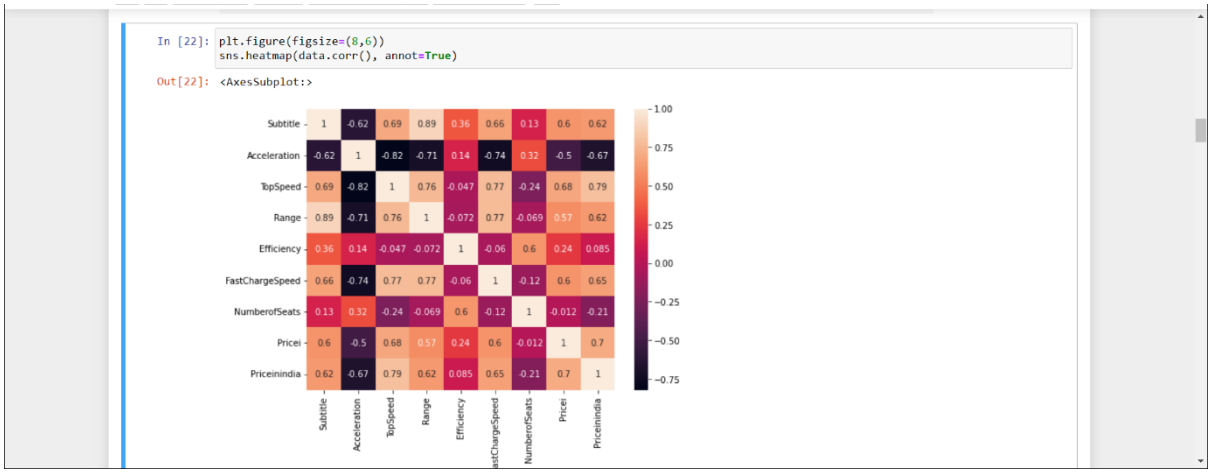
Out[19]:

	Name	Subtitle	Acceleration	TopSpeed	Range	Efficiency	FastChargeSpeed	Drive	NumberofSeats	Pricei	Priceinindia	Manufacturer
0	Opel Ampera-e	58.0	7.3	150	335	173	210	Front Wheel Drive	5	42990	0	Opel
1	Renault Kangoo Maxi ZE 33	31.0	22.4	130	160	194	0	Front Wheel Drive	5	0	31680	Renault
2	Nissan Leaf	36.0	7.9	144	220	164	230	Front Wheel Drive	5	29990	25995	Nissan
3	Audi e-tron Sportback 55 quattro	86.5	5.7	200	375	231	600	All Wheel Drive	5	0	79900	Audi
4	Porsche Taycan Turbo S	83.7	2.8	260	390	215	860	All Wheel Drive	4	186336	138830	Porsche

```
In [20]: data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 180 entries, 0 to 179
Data columns (total 12 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   Name             180 non-null    object
 1   Subtitle         180 non-null    float64
 2   Acceleration     180 non-null    float64
 3   TopSpeed         180 non-null    int64
 4   Range            180 non-null    int64
 5   Efficiency       180 non-null    int64
 6   FastChargeSpeed  180 non-null    int64
```

The data consists of 180 vehicles and there are some missing values as well. We can conduct various data analytics visualizations to understand the data and information. This gives us an idea about the market as a whole and overall data distribution. Often, this type of data gives insight into the market and lets businesses conduct market research. The electric vehicle market is growing at a fast pace, with proper investment and research, the field can be improved and a higher level of efficiency can be achieved.



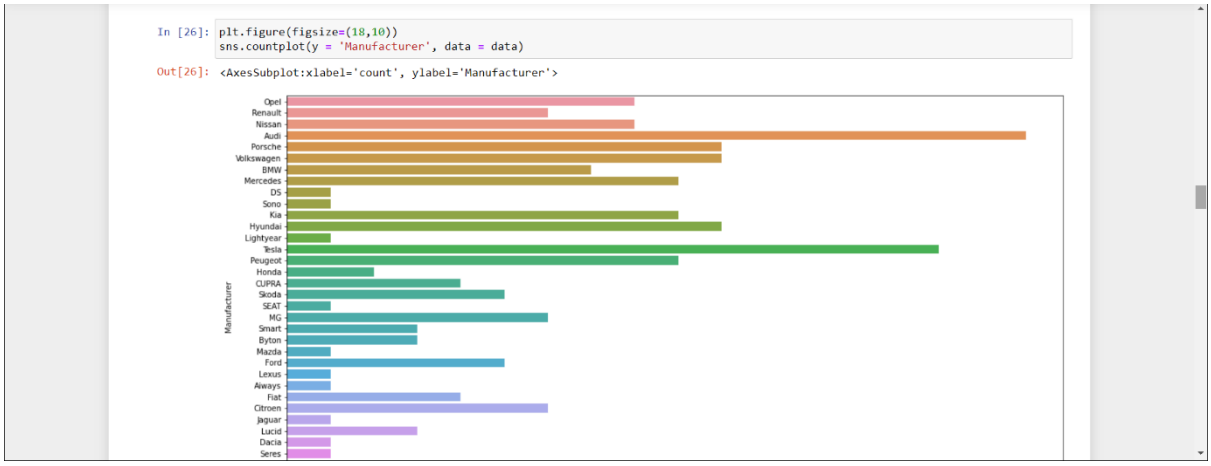
```
In [22]: plt.figure(figsize=(8,6))
         sns.heatmap(data.corr(), annot=True)
```

Out[22]: <AxesSubplot:>


```
In [8]: #filling empty data with 0
        data=data.fillna('0')
```

```
In [9]: data['Manufacturer'] = data.Name.str.split(' ', 1, expand=True)[0]
```

We can see that majority of the data is numeric. It is either float or integer, and 3 columns contain text data. Now, let us have a look at the correlation between the data.



ML Technique used

Random Forest Regressor is a powerful ensemble learning method often used for regression tasks . It works by constructing multiple decision trees during training and outputs the average prediction of the individual trees for regression tasks.

Target Segments:

So from the analysis we can see that the optimum targeted segment should be belonging to the following categories:

Behavioral: Mostly from our analysis there are cars with 5 seats.

Demographic: • Top Speed & Range : With a large area of market the cost is dependent on Top speeds and Maximum range of cars.

• Efficiency : Mostly the segments are with most efficiency.

Psychographic: • Price : From the above analysis, the price range is between 16,00,000 to 1,80,00,000. Finally, our target segment should contain cars with most Efficiency, contains Top Speed and price between 16 to 180 lakhs with mostly with 5 seats.

The marketing mix, often referred to as the 4Ps of marketing, is a fundamental framework used by businesses to develop and implement marketing strategies effectively. It consists of four interconnected elements that businesses can control to influence consumers' purchasing decisions. Here's an overview of the 4Ps:

Product:

- This represents the actual goods or services offered by a company. It involves decisions regarding product design, features, quality, branding, packaging, warranties, and more.
- For an Electric Vehicle (EV) startup, the product aspect includes the range of EV models, their specifications (battery capacity, range, performance), design aesthetics, charging infrastructure, after-sales services, etc.

Price:

- Price refers to the amount customers pay for the product or service. It involves determining the appropriate pricing strategy considering production costs, competitor pricing, perceived value, market demand, and pricing objectives.
- In the context of EVs, pricing strategies could consider factors like cost competitiveness compared to traditional vehicles, government subsidies or incentives, pricing models for battery leasing, and variations in pricing for different EV models.

Place (Distribution):

- Place refers to the channels and locations through which customers access the product or service. It involves decisions related to distribution channels, logistics, retail locations, online presence, and accessibility to the target market.
- For an EV startup, place considerations might include establishing partnerships with dealerships, setting up charging stations, online sales platforms, and ensuring widespread availability of EVs across key markets.

Promotion:

- Promotion involves all the activities used to communicate the value of the product or service to the target market and persuade potential customers to buy.
- Strategies for promoting EVs might involve advertising campaigns focusing on eco-friendliness, energy efficiency, tax benefits, sponsoring events, educational campaigns about EV technology, social media marketing, and collaborations with influencers or environmental organizations.

Additionally, in the contemporary marketing landscape, some variations of the marketing mix include additional Ps such as People, Process, and Physical Evidence, especially in service-based industries. These aspects emphasize the importance of customer service, the purchasing process, and tangible evidence of the service.

Overall, the marketing mix provides a structured approach for businesses to develop comprehensive marketing strategies by considering various elements that collectively influence consumer behavior and contribute to the success of a product or service in the market.