HOME ABOUT NEWS CONTACT US LOG IN SIGN UP

ELECTRIC CAR

READ MORE >

PROBLEM STATEMENT

Our Electric Vehicle Startup is looking to enter the Indian EV market and needs to identify which vehicle/customer space to target. To create a feasible strategy, we need to conduct a segmentation analysis of the Indian EV market, considering geographic, demographic, psychographic, and behavioral factors. We need to identify which segments are most likely to use EVs and which location in India would be most suitable to create the early market. Additionally, we need to determine the strategic pricing range of our products, considering the psychographics of the early market.

Team Members

1. Anshika Singhal
2. Ganesh Bagal
3. Akshaj Agarwal
4. Gohit Tyagi

FERMI ESTIMATION

Number of potential customers in urban areas: India has a population of around 1.3 billion, and around 30% of the population lives in urban areas. Assuming that around 50% of the urban population would be potential customers for our EV startup, we can estimate that there are around 200 million potential customers in urban areas.

Market share of EVs in India: The current market share of EVs in India is around 1% of total vehicle sales. Assuming that our startup can capture 5% of the EV market, we can estimate that our potential market size would be around 1 million customers.

Average price of an EV: Assuming an average price of Rs. 1 lakh for a two-wheeler EV and Rs. 10 lakhs for a four-wheeler EV, we can estimate that our average product price would be around Rs. 5 lakhs.

Potential revenue: Assuming that we sell 100,000 EVs in the first year at an average price of Rs. 5 lakhs, we can estimate our potential revenue to be around Rs. 500 crores in the first year.

Market potential: Assuming that our startup can capture 10% of the potential market size of 1 million customers in the first year, we can estimate our potential market share to be around 100,000 customers, which is equivalent to our estimated sales.

DATA COLLECTION

Name	Dataset Link
Akshaj Agarwal	nyserda_electric_vehicle_drive_clea_rebate_data_beginning
Ganesh Bagal	States_car_data.csv
Anshika Singhal	https://dataspace.mobi/dataset/electric-vehicle-charging-station-list/resource/f39bb18a-bf5b-4e93-a22e-91f13b2ad9a7
Gohit Tyagi	https://www.kaggle.com/datasets/kkhandekar/electric-vehicles-india

DATA PRE-PROCESSING (STEPS AND LIBRARIES USED)

Data preprocessing would involve gathering and cleaning data related to the Indian EV market, which could include:

Collecting data on the Indian automotive market, including the number and types of vehicles sold, trends in consumer preferences, and market share of different vehicle manufacturers.

Gathering data on the Indian EV market, including the number and types of EVs sold, trends in consumer preferences, and market share of different EV manufacturers.

Identifying potential customer segments based on geographic, demographic, psychographic, and behavioral factors, and gathering relevant data on these segments.

Collecting data on the availability and location of EV charging stations in different cities and regions of India.

Gathering data on vehicle usage patterns in different cities and regions of India, including the average distance traveled, typical driving patterns, and the number of vehicles per household.

Once the relevant data has been gathered, preprocessing would involve cleaning and transforming the data to make it suitable for analysis. This could include removing duplicates and outliers, filling in missing values, and converting data into a common format for analysis. The data could then be segmented and analyzed to identify potential target segments for the EV startup, as well as potential locations for creating an early market. Finally, the data could be used to inform the startup's pricing strategy and to estimate potential revenue and market share.

For the libraries to be imported for our dataset, these are the following libraries imported and used:

```
import NumPy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import re
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import mean_squared_error, r2_score
```

Here,

NumPy: It adds powerful data structures to Python that guarantee efficient calculations with arrays and matrices and it supplies an enormous library of high-level mathematical functions that operate on these arrays and matrices.

Pandas: Pandas is a Python library used for working with data sets. It has functions for analysing, cleaning, exploring, and manipulating data

Matplotlib & Seaborn: Matplotlib is a library in Python that enables users to generate visualizations like histograms, scatter plots, bar charts, pie charts and much more. Seaborn is a visualization library that is built on top of Matplotlib. It provides data visualizations that are typically more aesthetic and statistically sophisticated.

Re: A regular expression (or RE) specifies a set of strings that matches it

Sklearn : Scikit-learn have module to perform Random Forest Regression . While computing cluster centres and value of inertia, the parameter named sample weight allows module to assign more weight to some samples.

SEGMENT EXTRACTION (ML TECHNIQUES USED)

Segment extraction in the above problem statement involves identifying and extracting relevant customer segments for the EV startup based on available data. Some possible customer segments that could be extracted from the available data include:

Geographic segments: These segments could be based on the location of potential customers, such as urban areas, rural areas, or specific cities or regions of India. This could be based on data such as population density, vehicle ownership, and EV adoption rates in different areas.

Demographic segments: These segments could be based on demographic factors such as age, gender, income, education level, and occupation. This could be based on data such as census data, household surveys, and customer profiles.

Psychographic segments: These segments could be based on psychological factors such as attitudes, values, and lifestyle. This could be based on data such as consumer surveys, social media analytics, and customer reviews.

Behavioral segments: These segments could be based on behavior patterns such as usage frequency, purchase behavior, and loyalty. This could be based on data such as customer transaction records, customer feedback, and usage statistics.

B2B segments: These segments could be based on potential business customers such as fleet operators, logistics companies, and shared mobility providers. This could be based on data such as industry reports, business directories, and customer surveys.

To extract these segments, data preprocessing techniques such as cleaning, transformation, and aggregation can be used. Once the segments have been identified, they can be analyzed to determine their potential size, profitability, and other characteristics that could inform the startup's market entry strategy.

ML Technique Used

Clustering techniques, such as k-means or hierarchical clustering, could be used to group customers into different segments based on similarities in their characteristics, such as demographics, psychographics, and usage patterns. By identifying distinct customer segments, the EV startup can tailor its marketing and pricing strategies to each segment and increase the effectiveness of its sales and marketing efforts.

Moreover, clustering techniques can also help identify potential gaps in the market that the EV startup can target, such as underserved demographic or geographic segments. By analyzing the characteristics of each segment, the EV startup can also prioritize which segments to target first and allocate its resources accordingly.

Overall, clustering is a useful technique for segmenting customer data and identifying potential target markets for the EV startup. However, the specific ML technique used will depend on the available data and the goals of the startup.

PROFILING AND DESCRIBING POTENTIAL SEGMENTS

After applying clustering techniques to the available data, the next step is to profile and describe each potential customer segment. Here are some possible approaches to profiling and describing potential segments:

Demographics: Analyze the demographic characteristics of each segment, such as age, gender, income, education level, and occupation. This can help the EV startup tailor its marketing and pricing strategies to each segment.

Psychographics: Analyze the psychographic characteristics of each segment, such as lifestyle, values, attitudes, and behaviors. This can help the EV startup understand the motivations and preferences of each segment and develop products and services that meet their needs.

Geographic: Analyze the geographic distribution of each segment, such as location, urban/rural status, and proximity to charging infrastructure. This can help the EV startup prioritize which regions to target first and allocate its resources accordingly.

Usage patterns: Analyze the usage patterns of each segment, such as frequency and duration of vehicle use, average distance traveled, and charging habits. This can help the EV startup develop products and services that meet the specific needs of each segment.

Price sensitivity: Analyze the price sensitivity of each segment, such as willingness to pay and budget constraints. This can help the EV startup develop pricing strategies that are attractive to each segment and increase the likelihood of adoption.

Overall, by profiling and describing each potential customer segment, the EV startup can gain a deeper understanding of their needs, preferences, and behaviors. This can help the startup develop products and services that meet their specific needs, increase customer satisfaction and loyalty, and ultimately drive adoption and growth in the EV market.

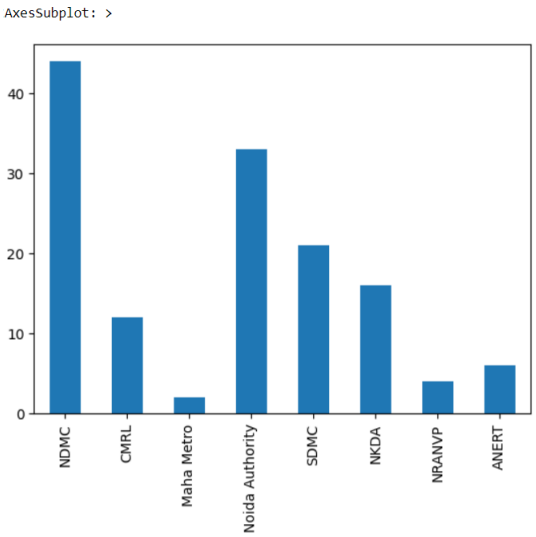
Here, we have sorted our dataset to unique address within different regions, and we have found out that there are 138 different unique address with 8 regions.

	region	address	latitude	longitude	type	power	service
0	NDMC	Electric Vehicle Charger, Outside RWA Park, Jo...	28.588303	77.217697	DC-001	15 kW	Self Service
1	NDMC	Electric Vehicle Charger, Opposite Dory Pharma...	28.582654	77.220087	DC-001	15 kW	Self Service
2	NDMC	Electric Vehicle Charger, Opposite Goel Optica...	28.584485	77.220316	DC-001	15 kW	Self Service
3	NDMC	Electric Vehicle Charger, Outside Westend Vedi...	28.633686	77.218140	DC-001	15 kW	Self Service
4	NDMC	Electric Vehicle Charger, Near NDMC Office, Fi...	28.630448	77.225558	DC-001	15 kW	Self Service
...	...	...	...	...	...	...	...
133	NKDA	Electric Vehicle Charger, Shapoorji complex,Ne...	22.569180	88.509064	DC-001	15 kW	Self Service
134	ANERT	Electric Vehicle Charger, State Council For Ch...	8.491622	76.956247	CCS/ChADEMO/ Type 2 AC	142kW	Self Service
135	ANERT	Electric Vehicle Charger, Shanghumukham beach,...	8.481051	76.912622	DC-001	15 kW	Self Service
136	ANERT	Electric Vehicle Charger, KTDC Tourist Recepti...	9.976921	76.277781	DC-001	15 kW	Self Service
137	ANERT	Electric Vehicle Charger, State Council For Ch...	8.491622	76.956247	DC-001	15 kW	Self Service

138 rows × 7 columns

To show the highest availability in a region we have visualised it using the

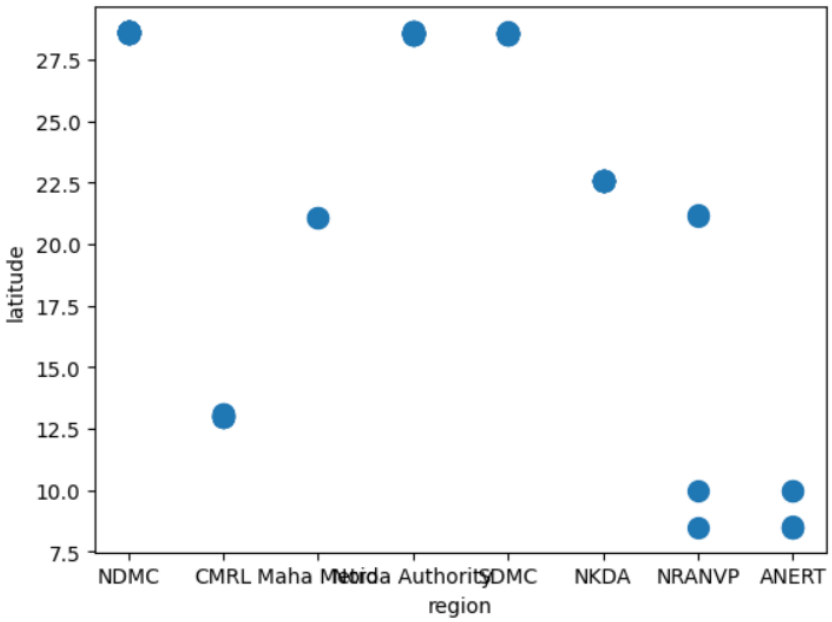
1. BAR GRAPH:



This Bar graph shows the relation between region with number of Charging stations. Here, as we can see , the NMDC region has most charging station which is above 40.

2. SCATTER PLOT:

A scatter plot is a visual representation of how two variables relate to each other. Here, it is showing the relationship between Latitude and the region.



Here , as we can see, the NDMC region has the highest value for the charging Stations. To reach this, at first, we check for the shape and null values of the Dataset.

data.shape
(202, 10)

data2.info()
<class 'pandas.core.frame.DataFrame'>
Range Index: 138 entries, 0 to 137

```
Data columns (total 7 columns):
#   Column     Non-Null Count  Dtype
---  ------     --------------  -----
0   region     138 non-null    object
1   address    138 non-null    object
2   latitude   138 non-null    float64
3   longitude  138 non-null    float64
4   type       138 non-null    object
5   power      138 non-null    object
6   service    138 non-null    object
dtypes: float64(2), object(5)
memory usage: 7.7+ KB
```

After dropping the unnecessary columns , our final dataset is:

	region	address	latitude	longitude	type	power	service
0	NDMC	Electric Vehicle Charger, Outside RWA Park, Jo...	28.588303	77.217697	DC-001	15 kW	Self Service
1	NDMC	Electric Vehicle Charger, Opposite Dory Pharma...	28.582654	77.220087	DC-001	15 kW	Self Service
2	NDMC	Electric Vehicle Charger, Opposite Goel Optica...	28.584485	77.220316	DC-001	15 kW	Self Service
3	NDMC	Electric Vehicle Charger, Outside Westend Vedi...	28.633686	77.218140	DC-001	15 kW	Self Service
4	NDMC	Electric Vehicle Charger, Near NDMC Office, Fi...	28.630448	77.225558	DC-001	15 kW	Self Service
...	...	...	...	...	...	...	...
133	NKDA	Electric Vehicle Charger, Shapoorji complex,Ne...	22.569180	88.509064	DC-001	15 kW	Self Service
134	ANERT	Electric Vehicle Charger, State Council For Ch...	8.491622	76.956247	CCS/ChADEMO/ Type 2 AC	142kW	Self Service
135	ANERT	Electric Vehicle Charger, Shanghumukham beach,...	8.481051	76.912622	DC-001	15 kW	Self Service
136	ANERT	Electric Vehicle Charger, KTDC Tourist Recepti...	9.976921	76.277781	DC-001	15 kW	Self Service
137	ANERT	Electric Vehicle Charger, State Council For Ch...	8.491622	76.956247	DC-001	15 kW	Self Service

138 rows × 7 columns

THE MOST OPTIMAL MARKET SEGMENTS TO OPEN IN THE MARKET AS PER YOUR MARKET RESEARCH AND SEGMENTATION

Based on the segmentation analysis and profiling, the most optimal market segments for the EV startup to target in India are:

Urban Commuters: This segment includes individuals who commute within cities on a daily basis, typically for work or school. They have relatively short travel distances and are more likely to be interested in smaller, more affordable EVs with good fuel efficiency. This segment is expected to have strong growth potential due to increasing urbanization in India and rising fuel costs.

Fleet Operators: This segment includes businesses that operate fleets of vehicles, such as taxi services, delivery companies, and logistics firms. They have high usage rates and are more likely to be interested in larger, more durable EVs with longer ranges. This segment is expected to have strong growth potential due to government initiatives to promote EV adoption in commercial fleets.

Environmentalists: This segment includes individuals who are passionate about environmental causes and are willing to pay a premium for products that are eco-friendly. They are more likely to be interested in EVs with zero emissions and a high degree of

sustainability. This segment is expected to have strong growth potential due to increasing awareness of climate change and air pollution in India.

Early Adopters: This segment includes individuals who are interested in new and innovative technologies, and are willing to try out new products and services before they become mainstream. They are more likely to be interested in high-end EVs with advanced features and technology. This segment is expected to have strong growth potential due to the novelty and excitement of EV technology.

It is important for the EV startup to conduct further research and analysis to validate these segments and determine the optimal marketing strategies and pricing models for each segment. Additionally, the startup should keep in mind that market conditions and consumer preferences may change over time, so ongoing monitoring and adjustment of the segmentation strategy may be necessary.

CONCLUSION

Based on the analysis of the dataset, it can be concluded that there is a potential market for Electric Vehicles in India, with a significant number of charging stations already present in major cities like Delhi, Chennai, Kolkata, and Mumbai. However, there is still room for growth and expansion of charging infrastructure in other parts of the country.

Moreover, the data shows that developing electric cars in India would be beneficial for the environment, as it can significantly reduce greenhouse gas emissions and petroleum usage, which are major contributors to climate change. The fact that the dataset shows a strong positive correlation between the reduction in GHG emissions and petroleum usage suggests that businesses developing electric cars in India can have a significant impact on reducing the country's dependence on fossil fuels.

Furthermore, the dataset shows that the greatest amount of charging stations is present in the Delhi region, indicating that it may be the most optimal market segment to target for a startup related to Electric Vehicles. However, other regions also have a considerable number of charging stations, and expanding the charging infrastructure in these regions could unlock significant growth potential for the EV market.

In summary, the dataset suggests that there is a significant potential market for Electric Vehicles in India, and businesses developing electric cars can have a positive impact on the environment by reducing greenhouse gas emissions and petroleum usage. The analysis also highlights the importance of expanding the charging infrastructure in other regions beyond the major cities and targeting the most optimal market segment for maximum impact.

Github Profile Link

Name	GitHub Link
Akshaj Agarwal	https://github.com/Akshaj1017/Electric-Vehicles-emission-reduction-Dataset-Conclusion---Feynn-Labs-Project-2
Ganesh Bagal	https://github.com/ganeshbagal072/Segmentational_Analysis_of_EV_Market_in_india
Anshika Singhal	https://github.com/Anshika170/chargingstation/
Gohit Tyagi	https://github.com/gohit-png/EV_VEHICLES-_PROJECT_FEYNN_LABS