SEGMENTATION ANALYSIS OF THE EV MARKET

Presented By

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1. Fermi Estimation (Breakdown of Problem Statement)

To address the problem statement, I deconstructed it into several elements and made estimations regarding their influence on the market. This involved analyzing factors such as geographical location, demographic characteristics, psychographic attributes, behavioral patterns, and the Innovation Adoption Life Cycle. By employing Fermi estimation techniques, I quantified the potential market size, customer base, and profit projections.

2. SOURCES OF DATA

From

Kaggle.com

From Kaggle we have collected data :

- No of Ev's and non-Ev's in each state of India.
- 2.Electric vehicle stations available in each state of India.
- 3.Demo data related to Annual salary with EV prices of an individual.
- 4.dataset related ev and their prices with features.

3.DATA PRE-PROCESSING

In data preprocessing step mostly, we used pandas and NumPy for Analysing the dataset for non-numerical and null values, changing non-numerical values to numerical values, checking for null values Removing Null Values or filling null values and Understanding the attributes of dataset.

```
In [3]: ev.isnull().sum()

Out[3]: Sr. No.                      0
        State Name                   0
        Total Electric Vehicle       4
        Total Non-Electric Vehicle   4
        Total                        4
        dtype: int64

In [5]: #fill ,missing values

        ev["Total Electric Vehicle"].fillna(ev["Total Electric Vehicle"].mode()[0],inplace=True)
        ev["Total Non-Electric Vehicle"].fillna(ev["Total Non-Electric Vehicle"].mode()[0],inplace=True)
        ev["Total"].fillna(ev["Total"].mode()[0],inplace=True)

In [6]: ev.isnull().sum()

Out[6]: Sr. No.                      0
        State Name                   0
        Total Electric Vehicle       0
        Total Non-Electric Vehicle   0
        Total                        0
        dtype: int64

In [7]: ev["Total Electric Vehicle"]=pd.to_numeric(ev["Total Electric Vehicle"],errors='coerce')

In [8]: ev.info()

        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 36 entries, 0 to 35
        Data columns (total 5 columns):
         #   Column                    Non-Null Count  Dtype
        ---  ------                    --------------  -----
         0   Sr. No.                   36 non-null     int64
```

4.SEGMENT EXTRACTION

As we gone through several datasets with several attributes such as vehicle fuel consumption, no of EV's present, annual salary, no. stations and reviews used prototypes, PCA, K-means clustering, Hierarchical clustering algorithms are some of the major clustering methods used.

5.PROFILING AND DESCRIBING POTENTIAL SEGMENTS

We have many different types of segments for each data on different criteria. Coming to behavioural segmentation data we have two different cluster Segmented them according to the no. of ev's and non ev's from each state and also Used EV stations for analysing more about each state for production of ev's. Gone through different vehicles and clustered them according to their speed, brand and no of seater for some ev's related to cars. We also analysed the ev's market in India by power consumption data and policies related to ev's . We brought an idea about transition of vehicles to electric vehicles by collecting data related to different types of fuel consumptions.

6.SELECTION OF TARGET SEGMENT

From the analysis of each dataset, we have selected top potential states are Uttar Pradesh, Maharashtra, Karnataka. Stations available mostly Maharashtra, Tamil Nadu, Delhi, Karnataka, Uttar Pradesh Segment according to the policies and power consumption segmentation analysis we find that most of the northeastern states along with Jammu and Kashmir, Chhattisgarh and Jharkhand are unsuitable for establishment of an EV startup due to lack of awareness of governments of the corresponding states regarding the adoption of Electric vehicles in their region. It is better to switch to central states like Delhi, Rajasthan, Bihar or states of the south like Maharashtra, Telangana and Karnataka as their government seems to be more aware and involved in process of effective adoption of EVs by their public. These states are also characterized by high consumption of power and higher charging stations (established by PSUs) and would therefore be a suitable choice for production of EVs. This result was visible after analysing all the segmentation techniques on the given data. From behavioural segmentation with k-prototypes clustering we can choose cluster 0 as a targeted segments with all the risk by concentrating on annual income and ev prices. And also from brand and acceleration with seating we concentrate on one such segment in which customers were interested in 5 seater and with price of 20 – 30 lakhs.

```
Out[21]:
```

	State Name	Total Electric Vehicle
0	Andaman & Nicobar Island	162.0
1	Andra Pradesh	21.0
2	Arunachal Pradesh	20.0
3	Assam	64766.0
4	Bihar	83335.0
5	Chandigarh	2812.0
6	Chhattisgarh	20966.0
7	Delhi	NaN
8	Goa	3870.0
9	Gujarat	45272.0
10	Haryana	37035.0
11	Himachal Pradesh	1175.0
12	Jammu and Kashmir	2941.0
13	Jharkhand	16811.0
14	Karnataka	NaN
15	Kerala	30775.0
16	Ladakh	26.0
17	Lakshadweep	21.0
18	Madhya Pradesh	21.0
19	Maharashtra	NaN
20	Manipur	586.0

ADAPTING THE MARKETING MIX

In order to efficiently focus on the designated segment, I suggest tailoring the marketing mix. This involves positioning the product as a high-performing electric vehicle that offers outstanding acceleration and range. Competitively setting the pricing will help attract the intended audience, taking into account the relatively higher price range of this particular segment. Furthermore, emphasizing the electric vehicle's innovative and advanced features, such as rapid charging abilities and energy efficiency, will resonate with the target customers.

State Name	Total Electric Vehicle	Sr. No.	Total Non-Electric Vehicle	Total
Andaman & Nicobar Island	162.0	1	1,46,945	1,47,107
Andra Pradesh	21.0	2	1,04,07,078	1,04,90,413
Arunachal Pradesh	20.0	3	2,52,965	2,52,985
Assam	64766.0	4	46,77,053	47,41,819
Bihar	83335.0	5	1,04,07,078	1,04,90,413
Chandigarh	2812.0	6	7,46,881	7,49,693
Chhattisgarh	20966.0	7	68,36,200	68,57,166
Goa	3870.0	9	10,71,570	10,75,440
Gujarat	45272.0	10	2,06,05,484	2,06,50,756
Haryana	37035.0	11	1,07,78,270	1,08,15,305
Himachal Pradesh	1175.0	12	19,64,754	19,65,929
Jammu and Kashmir	2941.0	13	18,69,962	18,72,903
Jharkhand	16811.0	14	64,86,937	65,03,748
Kerala	30775.0	16	1,57,74,078	1,58,04,853
Ladakh	26.0	17	38302	38328
Lakshadweep	21.0	18	1,04,07,078	1,04,90,413
Madhya Pradesh	21.0	19	1,04,07,078	1,04,90,413
Manipur	586.0	21	4,99,324	4,99,910
Meghalaya	49.0	22	4,59,001	4,59,050
Mizoram	21.0	23	3,15,626	3,15,647

ASSESSMENT OF POTENTIAL CUSTOMER BASE AND PROFITABILITY

Taking into account the potential customer base within the early market for the designated target segment and the projected pricing range, I conducted a calculation to determine the potential profit. By multiplying the estimated number of potential customers in the target segment by the target price range, we can obtain an estimate of the potential profit within the early market. This calculation serves as a valuable tool for evaluating the market's viability and the profitability associated with entering the identified segment.

THE MOST IDEAL MARKET SEGMENTS:

Following thorough market research and segmentation analysis, I have determined that Cluster 0 presents the most optimal market segment for our market entry strategy. This segment is well-suited to our product's performance and features, catering to a niche audience that exhibits a strong willingness to invest in high-end electric vehicles. By strategically

targeting this segment, we can greatly enhance our prospects for success in the Indian electric vehicle market.

INSIGHTS OF EV DATASET

- The high-value contribution to the EV market primarily comes from the C and B segments, while the S segment has the least contribution.
- In the EV market, Tesla, Audi, Nissan, and Volkswagen emerge as the prominent brands with the highest market share and occupancy.
- The majority of EV segments fall within the acceleration range of 10 and speed range of 200 to 400 kilometres.
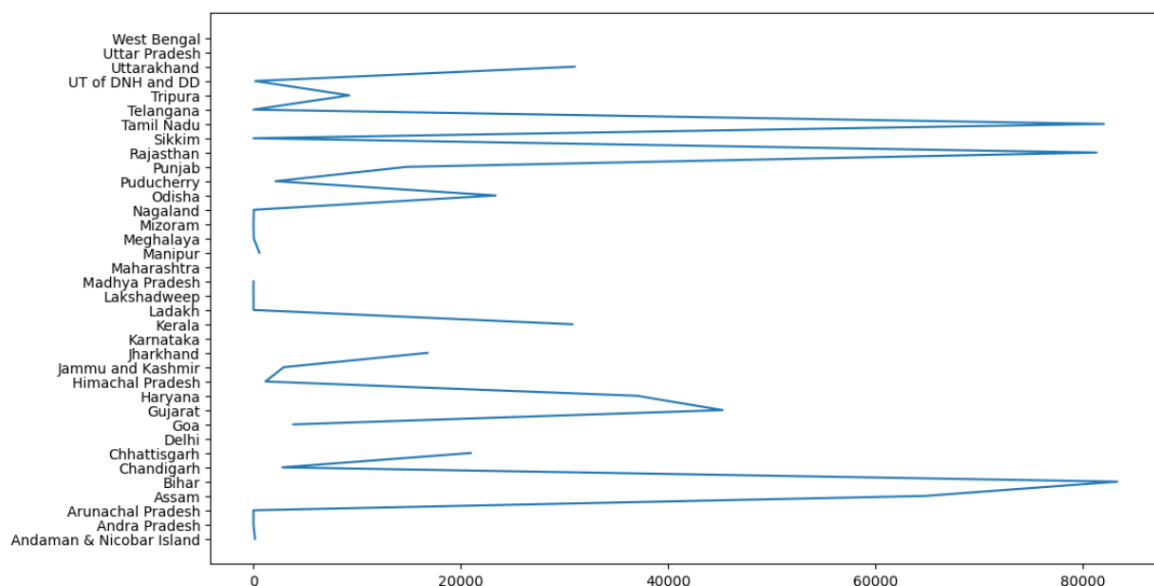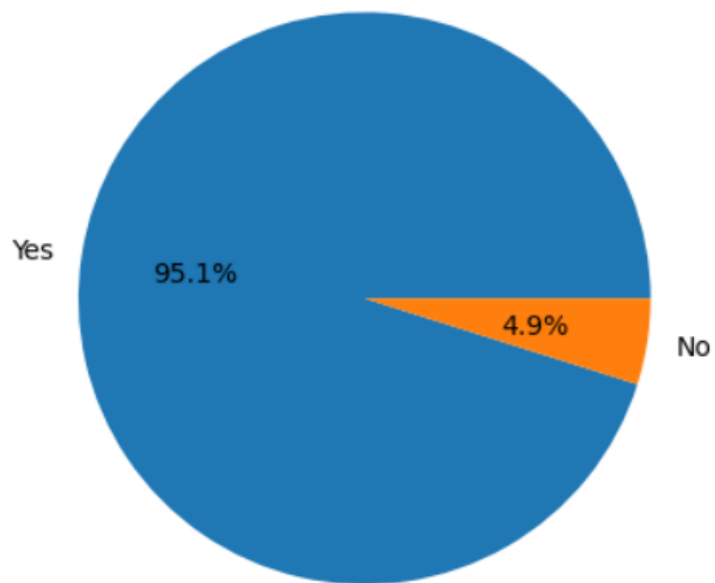

EV vehicles typically offer battery packs ranging from 100 to 125 kWh, accompanied by a speed range of 400 to 450 kilometres. However, vehicles equipped with a larger battery pack of 200 kWh provide a significantly higher speed range, reaching up to 1000 kilometres.

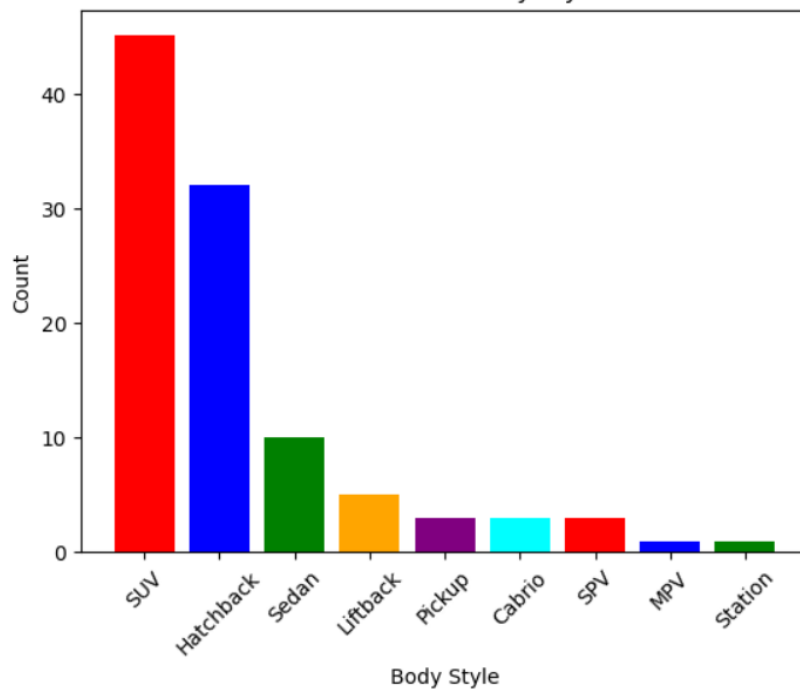The majority of EV vehicles fall within or below the price range of 40 million.

The majority of Tesla models offer an impressive range of up to 1000 kilometres, positioning them within the top 10 highest range EVs available.
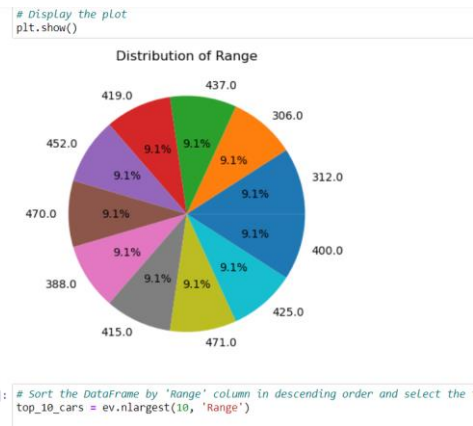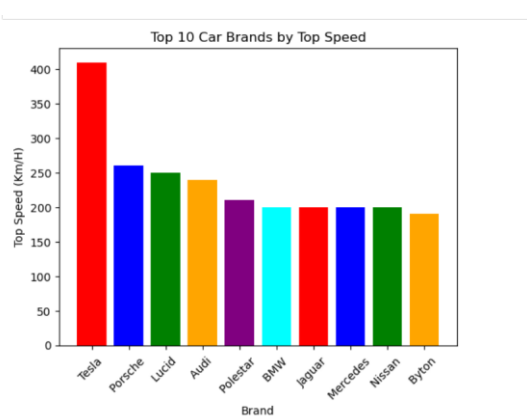
```
plt.show()
```

Distribution of Rapid Charge

Distribution of Body Style

Top 10 Car Brands by Top Speed


```
# Display the plot
plt.show()
```

Distribution of Range

```
In [35]:  # Sort the DataFrame by 'Range' column in descending order and select the
          top_10_cars = ev.nlargest(10, 'Range')
```

GITHUB LINK

https://github.com/kantana29/EvVehicle.git