ELECTRIC TWO WHELLER (BIKE/SCOOTER) MARKET SEGMENTATION

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INTRODUCTION:

The electric two-wheeler market has witnessed significant growth in recent years due to the increasing demand for eco-friendly and sustainable transportation solutions. Electric bikes and scooters are gaining popularity as a viable alternative to traditional gasoline-powered vehicles. As the market continues to expand, it becomes crucial for companies operating in this sector to effectively segment their target market and tailor their marketing strategies accordingly.

Market segmentation plays a vital role in understanding the diverse needs, preferences, and behaviors of consumers within the electric two-wheeler industry. By dividing the market into distinct segments, companies can identify specific customer groups with similar characteristics, allowing them to develop targeted marketing campaigns and product offerings that meet the unique requirements of each segment.

Segmentation criteria for the electric two-wheeler market can encompass various factors, including demographic, psychographic, geographic, and behavioral attributes. Demographic factors such as age, gender, income, and occupation can provide insights into the consumer profiles and purchasing power within different segments. Psychographic factors such as lifestyle, values, and attitudes towards sustainability and technology can offer deeper insights into consumer motivations and preferences.

Geographic segmentation considers regional variations in consumer demand and infrastructure support for electric two-wheelers. Urban areas with high traffic congestion and a growing emphasis on environmental sustainability may present distinct segments with specific transportation needs and preferences.

Behavioral segmentation focuses on consumer behaviors and patterns related to electric two-wheeler usage, including frequency of usage, distance traveled, charging habits, and usage preferences (e.g., commuting, leisure, or delivery purposes). Understanding these behavioral aspects can help companies tailor their product features, pricing strategies, and service offerings to match different segment requirements.

By effectively segmenting the electric two-wheeler market, companies can gain a competitive edge by customizing their marketing messages, product positioning, and distribution channels. This targeted approach allows them to reach the right customers with the right product offerings, leading to improved customer satisfaction, increased market share, and sustainable business growth.

DATA COLLECTION:

The data used in the report is obtained from the following source:

[Electric Vehicles Sales Report in India 2018 - India's best electric vehicles news portal](#)

[Mendeley Data](#)

https://taxindiaonline.com/RC2/inside2.php3?filename=bnews_detail.php3&newsid=43746

# DATA PRE-PROCESSING:

<u>Required libraries:</u>

In order to perform EDA and clustering on the collected data, the following Python libraries are used:
1. Pandas: for data handling/manipulation

2. Matplotlib and Seaborn: for data visualization

3. Scikit-learn: for the k-means clustering algorithm and some other algorithms.

```python
In [1]: import pandas as pd
        import matplotlib.pyplot as plt
        import seaborn as sns
        from sklearn.decomposition import PCA
        from sklearn.cluster import KMeans
```

IMPLEMENTING EDA ON DATASETS:

## Number of engines impact the price of electric scooters:
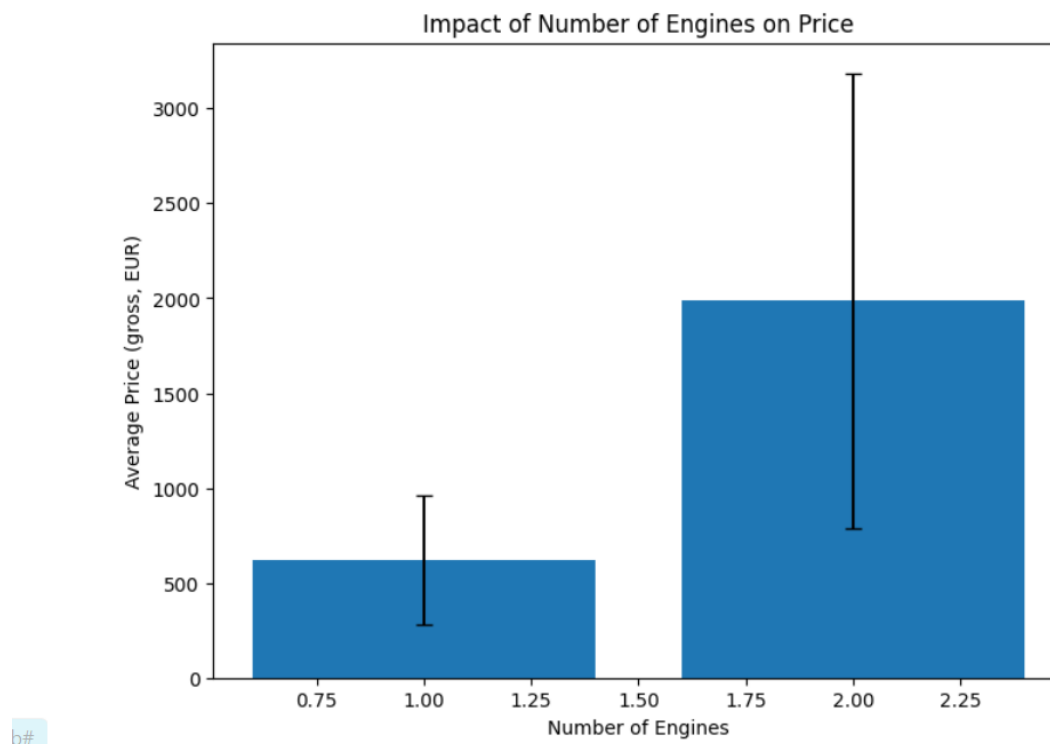
The number of engines have an impact on the price of electric scooters.Electric scooters with a higher number of engines tend to be priced higher than those with a lower number of engines. This is because a higher number of engines often indicates increased power and performance, which can contribute to a higher price.

## Price distribution vary between different age groups
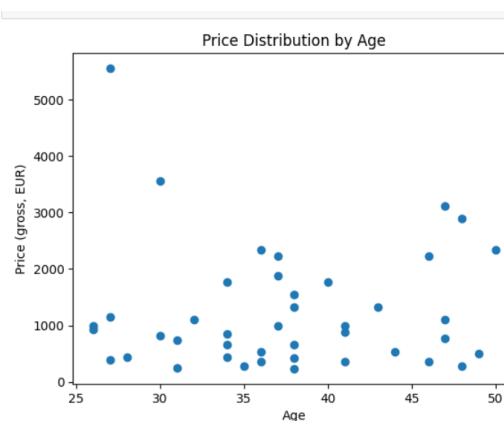
By examining the price distribution across age groups, we can identify trends and patterns related to consumer behavior and purchasing power. This information helps in understanding the preferences and buying capacity of different age segments.

**Battery capacity impacting the price of electric scooters**
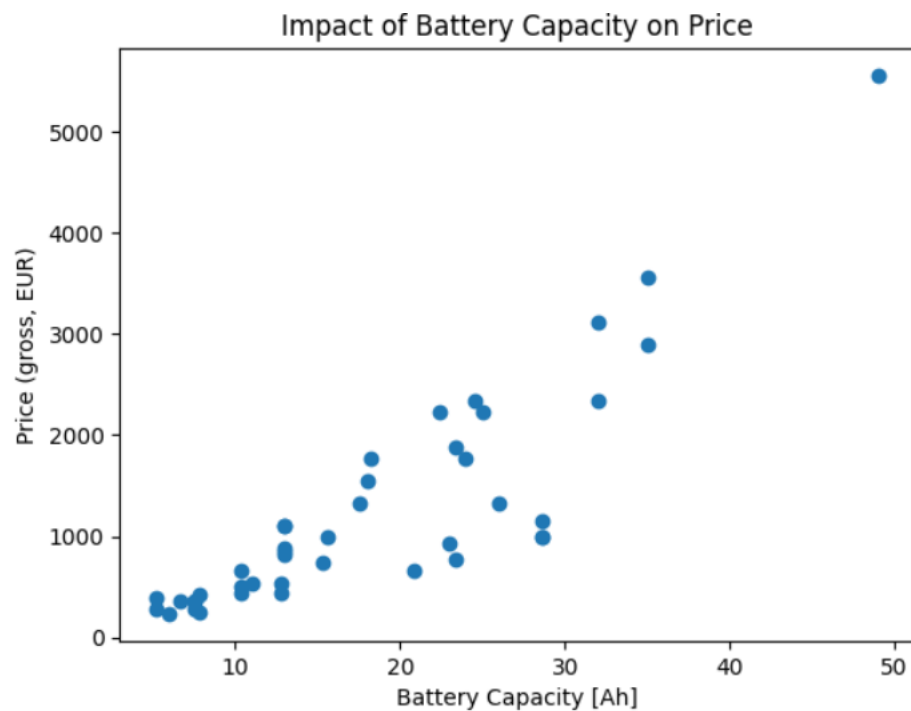
It can be seen from the plot that electric scooters with higher battery capacity tend to have a higher price compared to those with lower battery capacity. This is because a larger battery capacity allows for longer range and better performance, which are desirable features for many buyers.

**How does the price vary between different genders?¶**
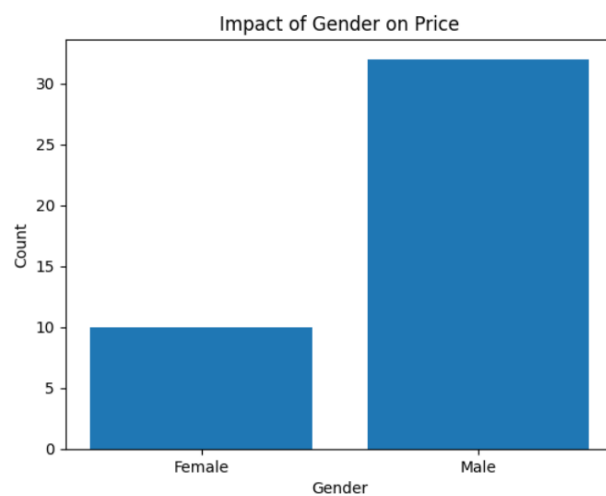
Price vary between different manufacturers or brands?

Impact of Manufacturer on Price
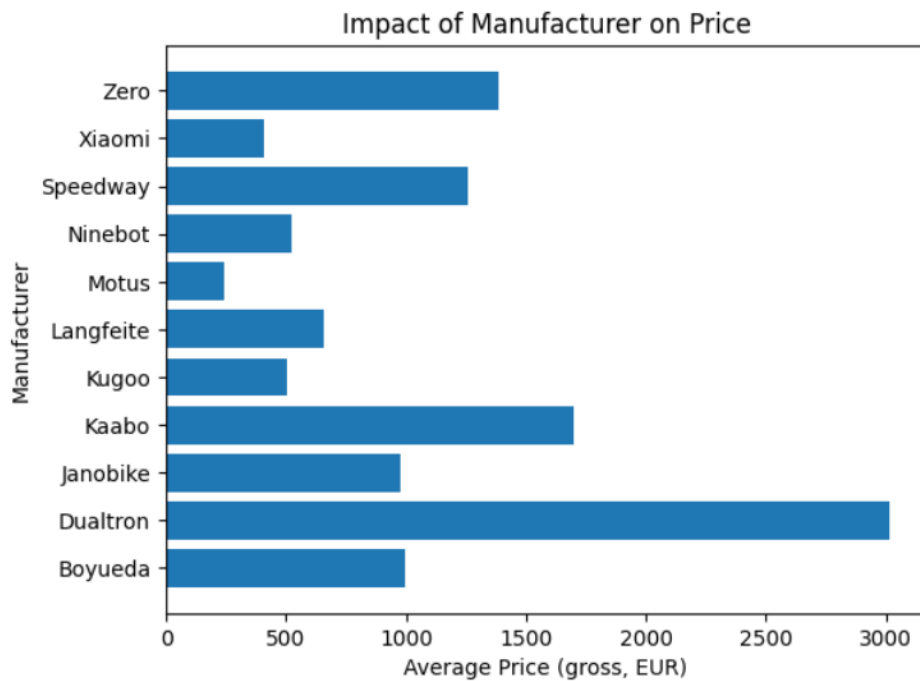
By analyzing the average price of electric scooters across different manufacturers or brands, we gained insights into pricing patterns and variations in the market. This information can be valuable for consumers looking to make informed decisions based on their preferred brand or for manufacturers to understand how their pricing compares to competitors.

**States where demand of Electric Scooters is higher**
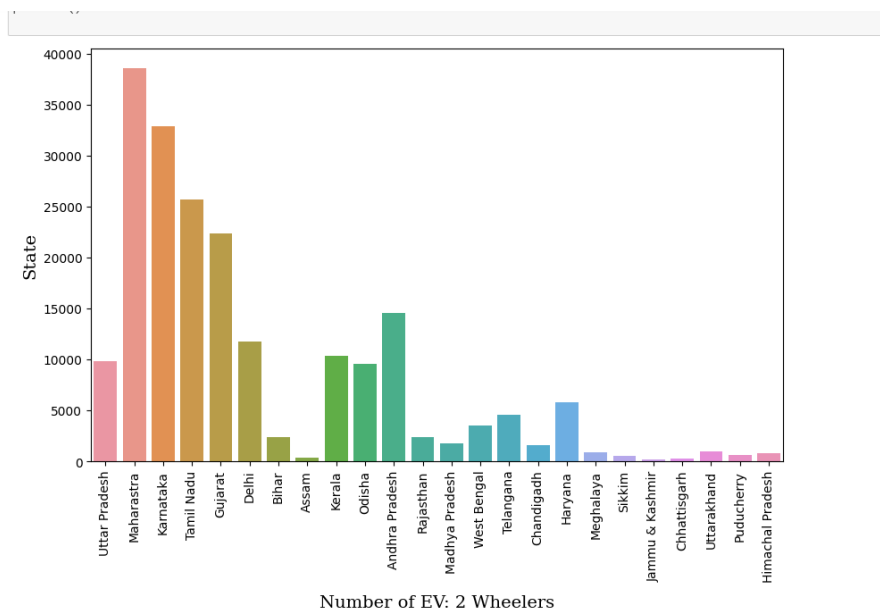
This bar plot visualizes the number of Two Wheelers (2W) for each region. Based on the heights of the bars, we can see that:

- Maharastra has the highest number of Two Wheelers, followed by Karnataka, Tamil Nadu, and Gujarat.
- States like Uttar Pradesh, Delhi, Bihar, and Assam have moderate numbers of Two Wheelers.
- Several states have relatively lower numbers of Two Wheelers, such as Kerala, Odisha, Chandigarh, Meghalaya, Sikkim, and Jammu & Kashmir.
- States like Chhattisgarh, Uttarakhand, Puducherry, and Himachal Pradesh have the lowest numbers of Two Wheelers.

The bar plot provides visual representation of the distribution of Two Wheelers across different regions. It allows us to compare the number of Two Wheelers in each region and identify the regions with the highest and lowest counts. This information can be useful for understanding the penetration of Two Wheelers in different geographic areas and can assist in making decisions related to infrastructure planning, marketing strategies, and policy-making specific to each region.

## Statewise Charging Facilities
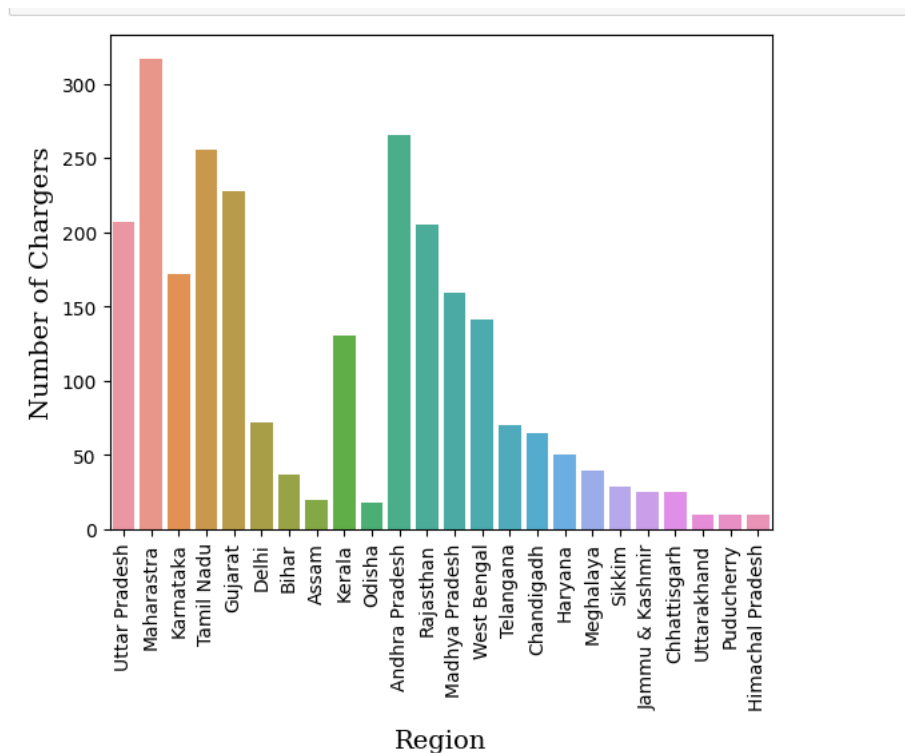
The bar plot provides a visual representation of the number of chargers available in each region.

The height of the bars indicates the quantity of chargers in each region.

Regional Variations: By comparing the heights of the bars, you can observe the variations in charger counts across different regions.

Some regions have higher charger counts, while others have lower counts.The bar plot allows for geographic segmentation based on charger availability. You can categorize regions into segments such as high-charger regions, moderate-charger regions, and low-charger regions. This segmentation helps in understanding the state of electric vehicle charging infrastructure across different geographic areas.

Are there any regions that show a significantly higher count of 2W vehicles compared to other vehicle categories in the geographic segmentation analysis?¶
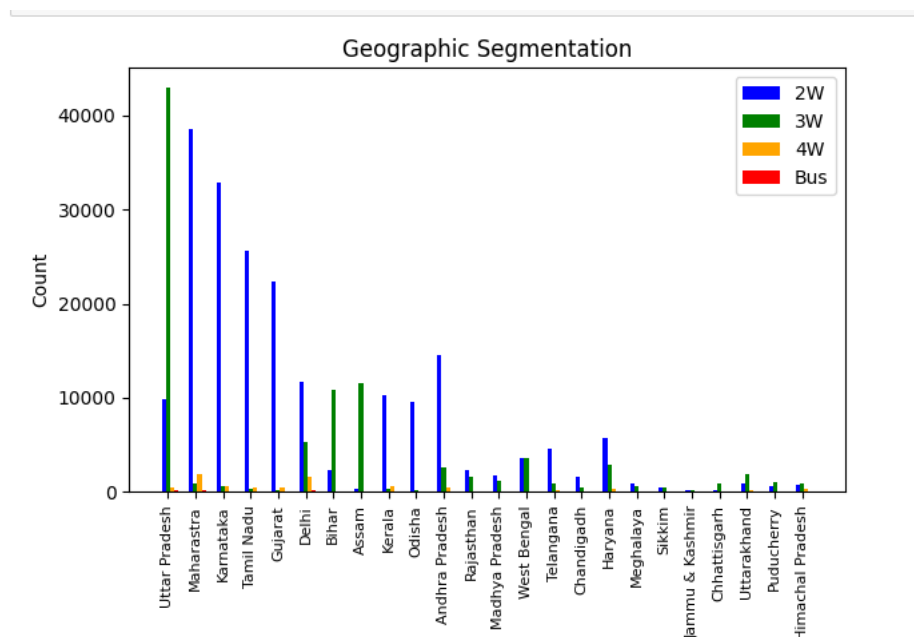
This bar plot provides a visual representation of the count of vehicles in different categories across regions. The categories include 2W (Two Wheelers), 3W (Three Wheelers), 4W (Four Wheelers), and Bus. The height of the bars indicates the count of vehicles in each category. By comparing the heights of the bars within each region, you can observe the variations in vehicle category distribution. In some regions, certain vehicle categories dominate over others. For example, in Uttar Pradesh and Tamil Nadu, the count of 2W vehicles is significantly higher compared to other categories. In Gujarat and Maharashtra, the count of 3W vehicles is relatively higher. The plot can provide valuable insights for policymakers and planners in terms of understanding the vehicle landscape in different regions. It can help identify regions with a higher demand for certain vehicle categories and support decision-making regarding infrastructure development and policy implementation.

Is there a correlation between the count of two-wheelers and other vehicle categories across different states in the geographic segmentation analysis?¶
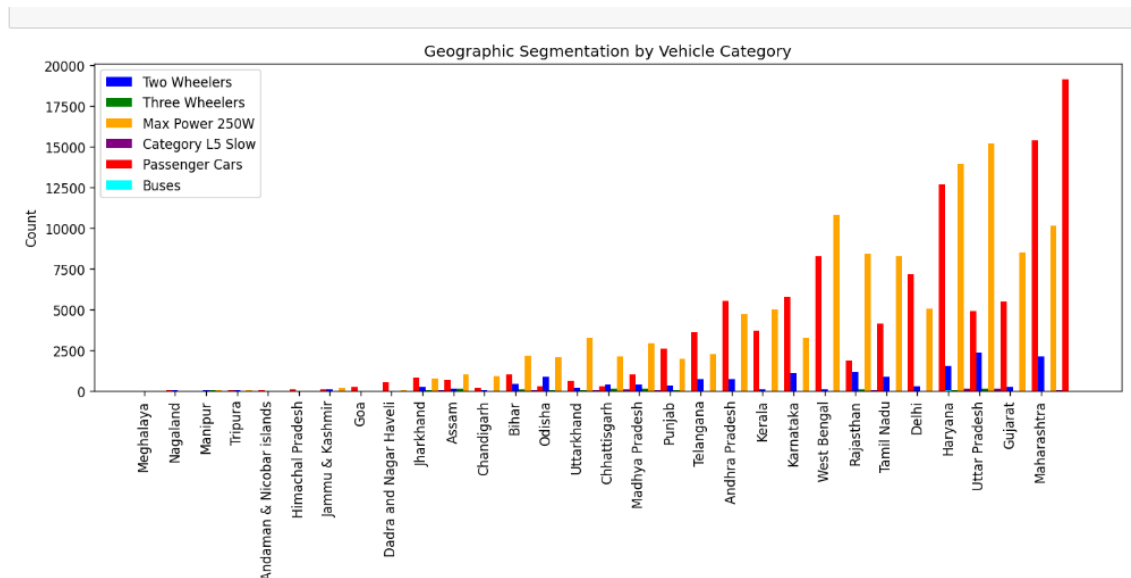
- The bar plot displays the distribution of different vehicle categories across various states in the dataset.

- The categories considered are "Two Wheelers," "Three Wheelers," "Passenger Cars," and "Buses."

- Maharashtra, Uttar Pradesh, and Gujarat are the top three states with the highest count of vehicles across all categories.

- The "Two Wheelers" category has a relatively higher count in states like Gujarat, Maharashtra, and Karnataka.

- The count of "Three Wheelers" is notable in states like Uttar Pradesh, Madhya Pradesh, and Rajasthan.

- "Passenger Cars" have a significant presence in Delhi, Maharashtra, and Tamil Nadu.

- The count of "Buses" is comparatively low across all states in the dataset.

- Geographic segmentation enables businesses and policymakers to tailor their strategies and policies to target specific regions and cater to the preferences and needs of the local population.

K-means Clustering: K-means clustering was applied to the dataset to identify homogeneous groups or clusters of customers based on their characteristics. The number of clusters was determined using the elbow method, which helped identify an optimal number of segments that captured the underlying patterns in the data.

Principal Component Analysis (PCA): PCA was performed to reduce the dimensionality of the dataset and identify the most influential variables driving customer segmentation. It helped uncover hidden patterns and relationships among the variables, providing insights into the key factors that contribute to the differentiation of customer segments.
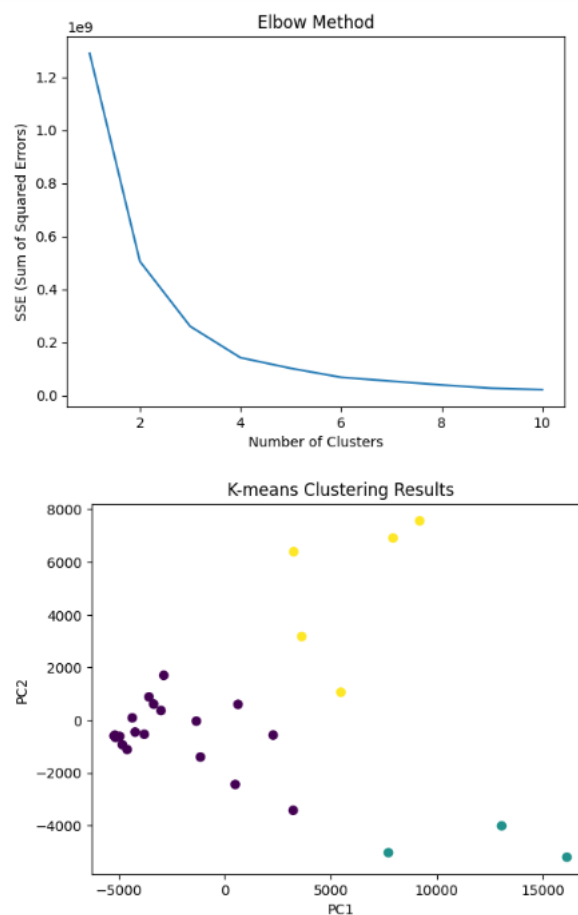
Segment Profiles:

```
    Two Wheelers (Category L1 & L2 as per Central Motor Vehicles Rules  \
0                                                    284.000000
1                                                   3735.666667
2                                                   2018.800000

    Two Wheelers (Category L2 (CMVR))  \
0                        252.909091
1                        855.000000
2                       1188.000000

    Two Wheelers (Max power not exceeding 250 Watts)  \
0                                       1471.590909
1                                       7880.000000
2                                      11304.600000

    Three Wheelers (Category L5 slow speed as per CMVR)  \
0                                           5.954545
1                                           2.000000
2                                          50.400000

    Three Wheelers (Category L5 as per CMVR)  \
0                                22.045455
1                                 2.666667
2                                45.400000

    Passenger Cars (Category M1 as per CMVR)     Buses  Cluster Size
0                            1588.545455  0.181818            22
1                           15737.333333  7.666667             3
2                            4682.200000  0.000000             5
```

The output provides insights into how the variables differ across the identified clusters, allowing for segmentation and profiling of the data. Each cluster represents a distinct group with similar characteristics based on the numerical variables.

Github Link: SimranKachle/feynn_labs_InternshipTask2 (github.com)