ELECTRIC VEHICLE MARKET SEGMENTATION ANALYSIS

Jocelyn Joseph

https://github.com/JocelynJoseph10/ELECTRIC-VEHICLE-MARKET-SEGMENTATION

There can be no denying that the era of **electric vehicles (EVs)** is well and truly upon us. With zero tailpipe emissions, EVs are a direct cure for air pollution and will also help reduce **oil imports**. There has been a significant rise in the production and sales of electric vehicles in recent years. Many major automobile manufacturers have invested heavily in EV technology, launching a wide range of electric models to cater to the growing demand. This increased availability and diversity of electric vehicles contribute to the notion that the era of EVs is indeed underway.

Advancements in battery technology and infrastructure have played a crucial role in accelerating the adoption of EVs. The development of more efficient and affordable batteries has extended the driving range of electric vehicles, reducing range anxiety for consumers. Additionally, the expansion of charging infrastructure, including public charging stations and home charging solutions, has improved the convenience and accessibility of EVs for drivers.

Furthermore, governments and policymakers around the world have shown a strong commitment to promoting electric vehicles as a means to address climate change and reduce emissions.

OVERVIEW

India has been a latecomer to the electric vehicle market, with only around 0.1% of total vehicles being electric. However, in recent years, the Indian government has implemented a series of policies and initiatives to boost the adoption of EVs. For instance, the government has launched the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme, which provides financial incentives for the purchase of electric vehicles. Under FAME II, the government has allocated INR 10,000 crore ($1.4 billion) for electric vehicle adoption and infrastructure development over the next three years.

According to a recent report, India's electric vehicle (EV) market, including EV two-wheelers and three-wheelers, is expected to grow at a compounded annual growth rate (CAGR) of 90% to touch $150 billion by 2030. The Indian electric vehicle industry is estimated to grow at a CAGR of 90%. The sales of electric vehicles accounted for barely 1.3% of total vehicle sales in India during the year 2020-21. The EV two-wheeler and three-wheeler market is growing rapidly. It is estimated that by the year 2030, the country's shift to high-speed electric mobility will help save nearly one gigaton of carbon dioxide emissions from vehicles.

India electric vehicle market is projected to grow from $3.21 billion in 2022 to $113.99 billion by 2029 at a CAGR of 66.52% in forecast period, 2022-2029.

THE RISE OF ELECTRIC VEHICLE STARTUPS

The Indian automobile sector is the fifth-largest in the world and is the world's top producer of buses and two- and three-wheelers, respectively. This paves the way for the market's size and associated opportunities to support the growth momentum in the following ten years to be disclosed. The market for electric vehicles (EVs) is thus expanding rapidly on a global scale. The Indian EV sector is likewise developing quickly and is predicted to record a growth of USD 113.99 billion in 2029. The growth in the sector is primarily attributed to growing investment, and as per Ernst & Young's report, India's electric vehicle industry attracted massive investments of about $6 billion in 2021 and is projected to attract $20 billion by 2030.

Boost to the EV startup landscape

The EV startup landscape is constantly growing due to the growing demand in the country. The industry has seen excellent growth over the years, bringing in 570 million worth of funding in 2021 and seeing 43 startups in the EV mobility field raise 673 million in funding in 2022.

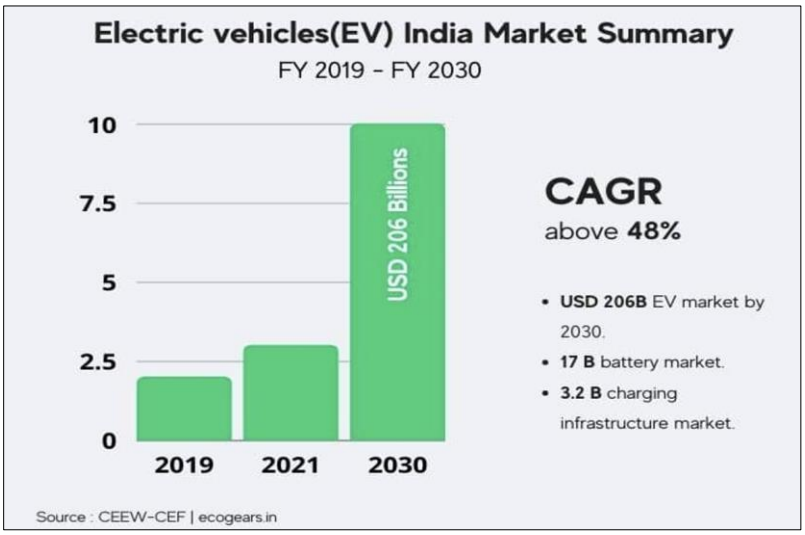
Government support for the growth of the EV startup ecosystem

The Indian government's push for electric vehicles creates a wide range of business prospects for EV startups in the infrastructure, energy, and mobility sectors. These include growth opportunities in the EV OEM market, battery infrastructure, solar car charging, and battery swapping technology. NITI Aayog estimates that a total investment of US$ 267 billion (Rs. 19.7 lakh crore) in EVs, battery infrastructure, and charging infrastructure is necessary to make the full transition to EVs. As per the Ministry of Skill Development and Entrepreneurship (MSDE), the EV industry might add 10 million direct jobs by 2030, producing 50 million indirect jobs in the sector.

India's flagship EV programme (FAME) has been essential in stimulating EV demand in the nation. The transition from the first phase of the initiative (2015-2019), which cost $128 million, to the second phase (2019-2024) boosted government subsidies for the EV ecosystem tenfold to $1.35 billion. Phase II further increased vehicle sales by 1 million 2Ws, 500,000 3Ws, 55,000 passenger cars, and 7,090 buses, compared to the first phase's target of supporting 280,000 EVs. This implies that the government is staying true to its commitment to electrifying its

transportation sector. Further, the government has given tax exemption of up to Rs.1,50,000 (US$ 1,960) under section 80EEB of income tax while purchasing an EV (2W or 4W) on loan. State-wise road tax reductions and other incentives have also been granted to promote EV adoption.

The way forward



The sharpest rise is expected to be seen in 0.5 – 1.5 ton Light Commercial Vehicles (LCVs) – 4 & 3 wheelers along with the 2 wheeler – scooter, bike and loaders as the fastest growing segments.

The Indian electric vehicle ecosystem is still in its early phases of development but is gradually gaining momentum. The government has supported EV policies and incentives with great initiatives such as the FAME II incentives aiding in the adoption of electric vehicles. Indian EV startups are evolving to maintain their technology lead, and established businesses have quickly adjusted to changes in customer demands. India is predicted to add an additional 300 million vehicles to its roadways by 2040 due to its fast-expanding economy and population, which will be the biggest increase in the global automobile market and an opportunity for an increase in the number of EV vehicles on the road.

ABSTRACT

Market segmentation is recognized as a crucial tool for the successful adoption and penetration of emerging technologies like EVs. It involves dividing the market into distinct segments with common characteristics and preferences, allowing businesses to tailor their strategies to different consumer groups. The adoption of EVs is expected to grow significantly in the near future. This growth is attributed to the benefits of EVs, such as low emissions and lower operating costs, which make them attractive to consumers.

The increasing interest in EV adoption and its potential impact on the transportation industry has sparked academic curiosity. This implies that researchers are keen to study and understand the factors driving EV adoption and the various segments of potential buyers. The main objective of the study is to explore and identify distinct segments of potential EV buyers. This segmentation will be based on psychographic (psychological and lifestyle factors), behavioral (actions and preferences), and socio-economic (financial and demographic) characteristics of consumers.

OBJECTIVES

1. Understanding Indian consumers' concerns and behaviors related to electrical vehicles.
2. Indian Electric vehicle market segmentation using segmentation analysis and clustering to develop a feasible strategy for an EV Start-up to enter the market, targeting the segments most likely to use Electric vehicles.
3. To identify the states/locations which are feasible for a new EV Start-up to set up their operations in the early market.

1. FERMI ESTIMATION OF EV VEHICLES

Assumptions:

1. **Total Vehicles in India:** According to various estimates, there were over 300 million vehicles in India in 2021, including two-wheelers, cars, trucks, etc.
2. **EV Market Share:** As of 2021, the market share of EVs in India was relatively low, estimated at around 1-2% of the total vehicle market.
3. **Growth Rate:** The EV market in India has been growing, with government incentives and increased awareness. You can assume a conservative annual growth rate (e.g., 20% per year) for EV adoption.

Steps:

1. **Initial Estimate:** Start with the assumption that EVs make up approximately 2% of the total vehicle market in India. This would mean there are roughly 2% of 300 million vehicles, which is about 6 million EVs in India in 2021.
2. **Future Growth:** Assuming a conservative annual growth rate of 20%, you can estimate the number of EVs in subsequent years. For example:
    - 2022: 6 million EVs * 1.2 = 7.2 million EVs
    - 2023: 7.2 million EVs * 1.2 = 8.64 million EVs
3. **Consider Government Initiatives:** Take into account any government initiatives, incentives, or policies that might accelerate EV adoption. For instance, government incentives can significantly impact EV adoption rates.
4. **Local Factors:** Consider local factors and trends that might affect EV adoption in specific regions of India, as adoption rates can vary.

PROBLEM STATEMENT

The electric vehicle (EV) market is experiencing rapid growth and evolving consumer preferences. To effectively target and serve the diverse customer base, it is imperative to conduct a comprehensive market segmentation analysis. The objective of this analysis is to identify distinct consumer segments within the EV market based on various demographic, psychographic, and behavioral factors.

2. DATA SOURCES

2.1. Government Reports and Databases:

- I accessed relevant government reports and publications.
- These reports were published by data.gov.in , and the data was current.

  https://data.gov.in/resource/year-wise-detail-are-under-sale-electric-vehicles-evs-during-2019-20-and-2021-22

2.2. **Kaggle Datasets**:

- https://www.kaggle.com/datasets/deadprstkrish/ev-cars-user-reviews-india
- https://www.kaggle.com/code/sjsumanth/ev-segmentation

2.3. **Academic Research:**

- https://www.sciencedirect.com/science/article/abs/pii/S0969698922000625

These studies were selected based on their relevance and reliability.

3. DATA PRE-PROCESSING

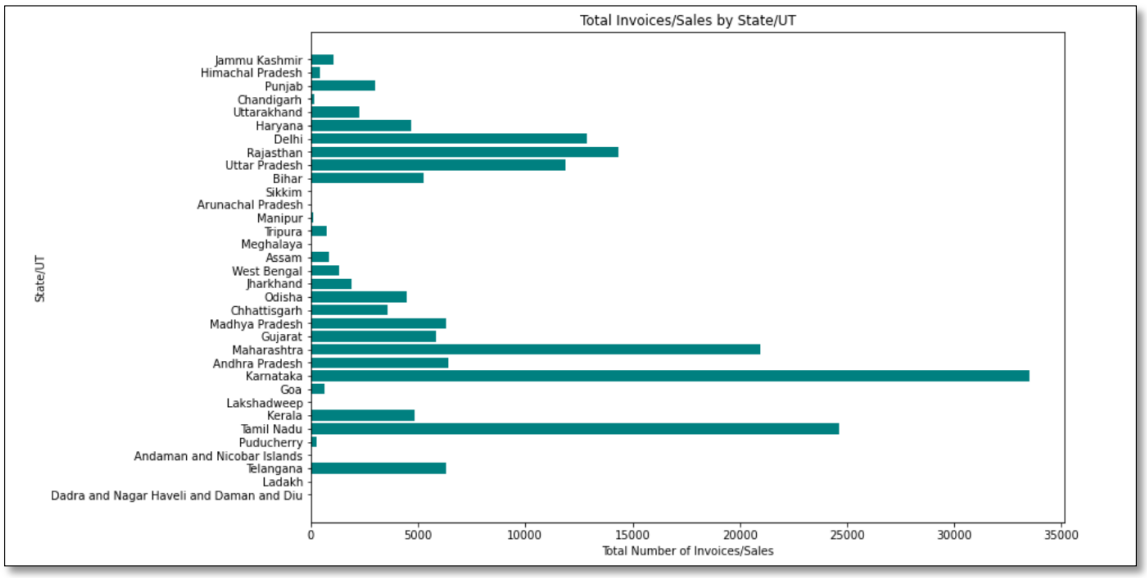
The libraries that we have used for data pre-processing are as follows

1) Numpy 2) Pandas 3) Seaborn 4) Matplotlib

3.1 GEOGRAPHY ANALYSIS

Exploratory Data Analysis (EDA) is a crucial step in understanding and summarizing data, especially when you have a dataset like the one you've provided, which appears to contain information about the total number of invoices or sales in different states and union territories of India. EDA helps you uncover patterns, relationships, and insights within the data.

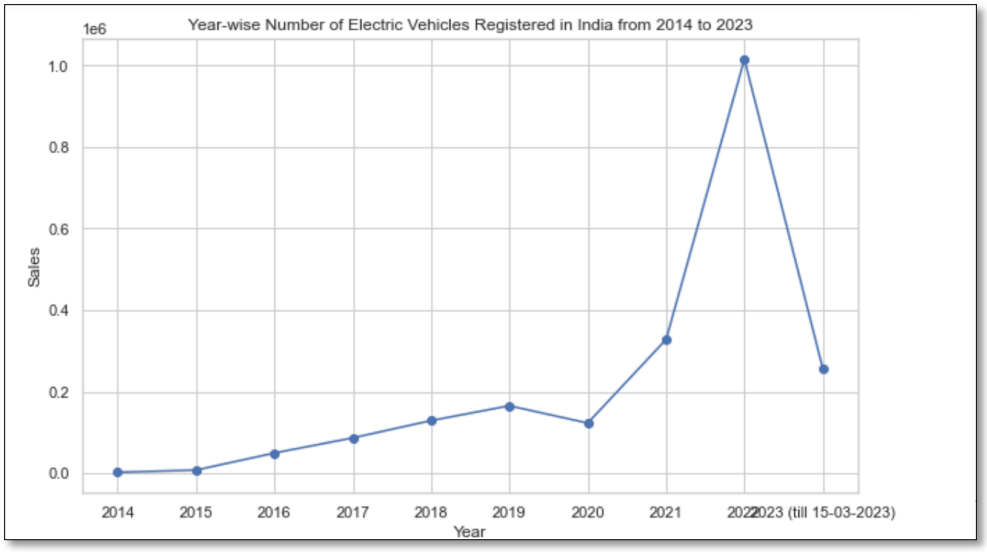
i. Total Invoices/ Sales of Electric Vehicles in the states/UTs of India



- The given bar plot shows the sale of electric vehicles in the different states and union territories of India during the year 2021.
- Karnataka, Maharashtra, and Tamil Nadu are the top three states/UTs with the highest number of invoices/sales, indicating significant purchases in these regions.

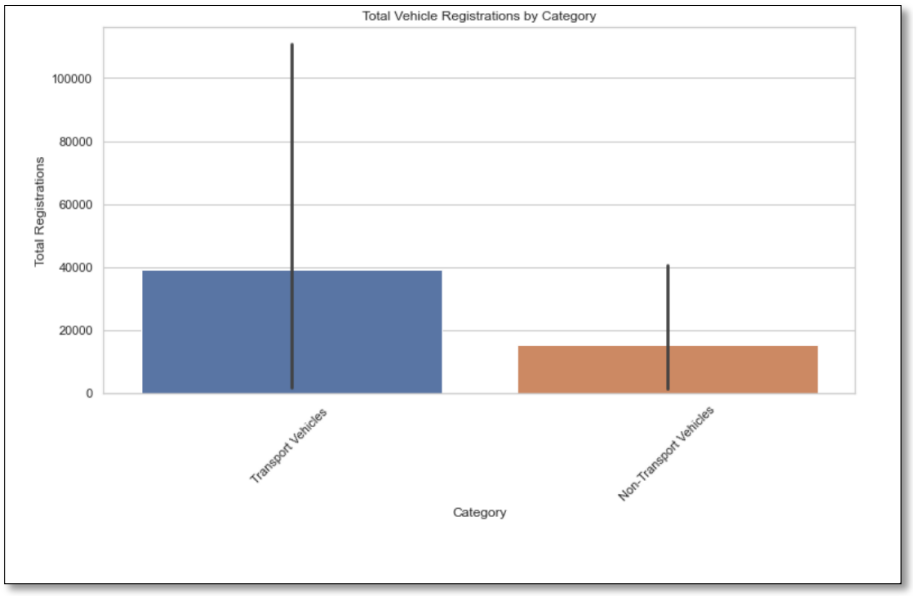
- Smaller states and union territories like Lakshadweep, Sikkim, and Andaman and Nicobar Islands have relatively lower numbers of invoices/sales, which is expected due to their smaller populations and economies.

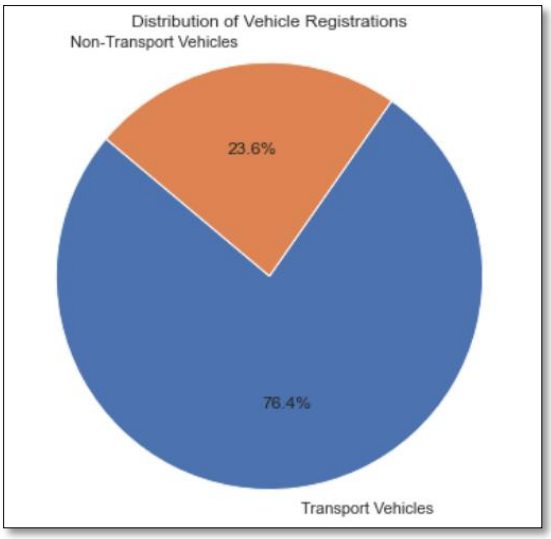
ii. Year-wise Number of Electric Vehicles Registered in India from 2014 to 2023



- The data suggests a continuous growth in electric vehicle registrations in India from 2014 to 2023. There is a noticeable acceleration in electric vehicle registrations in India, especially in the last few years (from 2019 to 2023). The count has increased significantly, indicating a growing interest in electric vehicles.
- **2022 Spike:** The year 2022 stands out with a remarkable increase in electric vehicle registrations, possibly due to a combination of factors, including increased adoption by consumers and businesses, improved infrastructure, and reduced prices of electric vehicles.

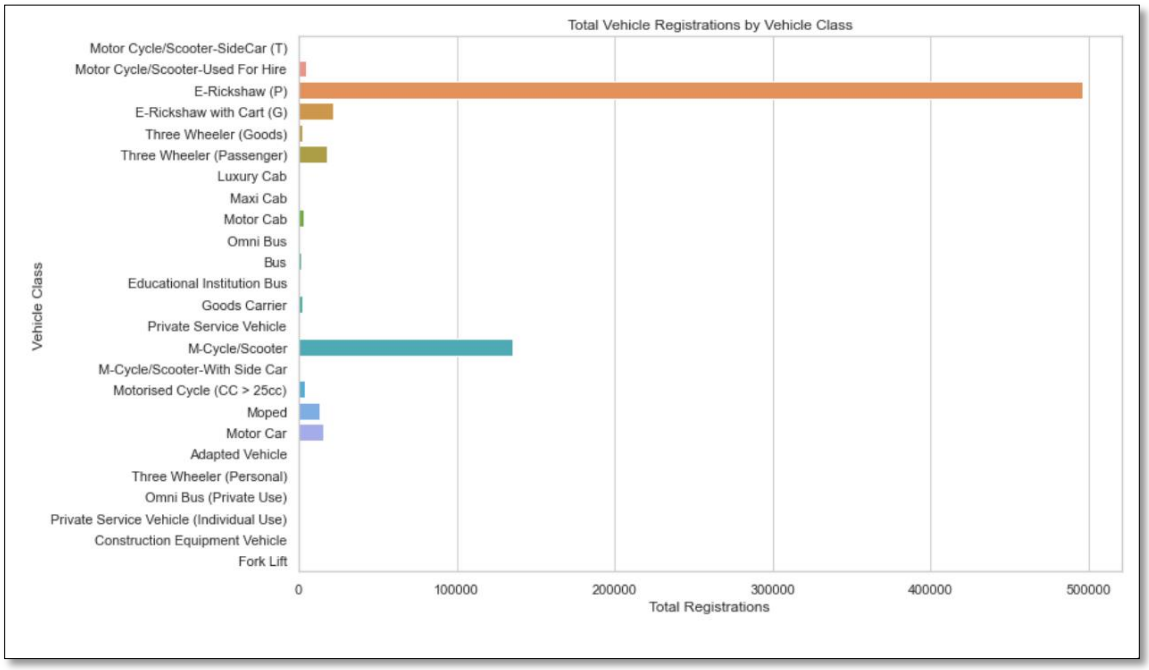
iii. Total Vehicle Registrations by Category





- From the bar plot and the pie chart, it is clear that 76% of the electric vehicles registered are used for the purpose of transport.

iv. Total Electric Vehicle Registrations by Vehicle Class



- **Transport Vehicles:**

  E-Rickshaws Dominate: The category "E-Rickshaw (P)" has the highest number of registered vehicles, with 495,781 units. This suggests that electric rickshaws are widely used for transportation purposes, likely due to their eco-friendly and cost-effective nature.

- **Non-Transport Vehicles:**

  Motorcycles and Scooters: "M-Cycle/Scooter" has the highest number of registrations in the non-transport category, with 135,691 units. This is indicative of the popularity of two-wheelers for personal use.

  The above data suggests that the start-up company should look towards manufacturing E-Rickshaws if it wants to manufacture Transport Vehicles or it should start manufacturing E- Scooters / Cycles if it wants to enter the market of manufacturing Non-Transport Vehicles.

3.2 REVIEW ANALYSIS

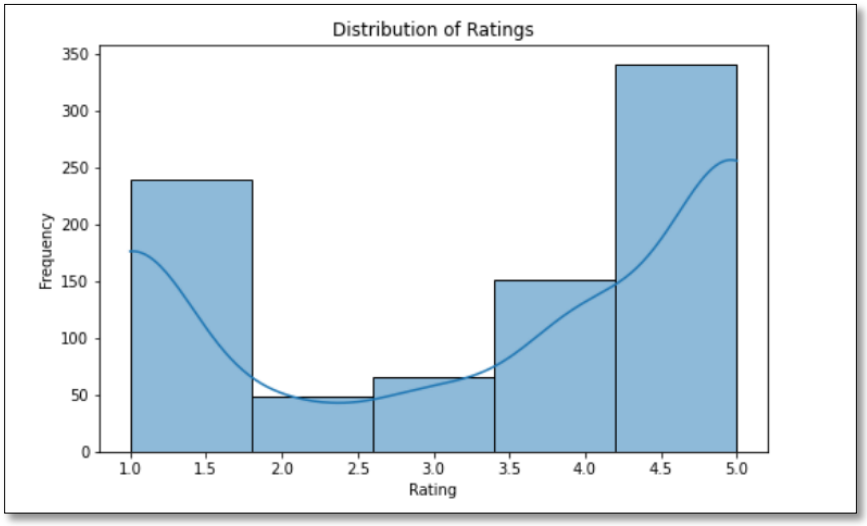
EV2

The dataset consisted of web scraped data of 2 wheeler electric vehicles from the bikewale website.

The cleaned dataset is as follows:

	review	Used it for	Owned for	Ridden for	rating	Visual Appeal	Reliability	Performance	Service Experience	Comfort	Value for Money	Model Name	Target	Sentiment
0	checked bike capacity km full charge given hel...	Daily Commute	Never owned	NaN	1	3.0	4.0	3.527536	3.145092	4.0	1.0	TVS iQube	-1	-0.8750
1	performance poor bike charging problem big thi...	Everything	> 1 yr	< 5000 kms	1	3.0	1.0	3.527536	1.000000	3.0	3.0	TVS iQube	-1	-0.7717
2	purchased april sales staff clueless new vehic...	Daily Commute	< 3 months	< 5000 kms	3	4.0	4.0	3.527536	2.000000	5.0	2.0	TVS iQube	0	0.8176
3	issues come scooty parts available service cen...	Daily Commute	6 months-1 yr	5000-10000 kms	1	1.0	1.0	3.527536	1.000000	1.0	1.0	TVS iQube	-1	-0.4019
4	buy vehicle unless near tvs iqube service cent...	Daily Commute	6 months-1 yr	< 5000 kms	1	3.0	4.0	3.527536	1.000000	3.0	2.0	TVS iQube	-1	-0.5719

i. Distribution of ratings for 2 wheeler EVs.



From the above graph, it is clear that majority of the customers were happy using the 2 wheeler EVs, and hence gave the rating 5. It is also a concern that around 230 reviews weren't good and hence the ratings were low

ii. Mean rating by Ownership

	Owned for	rating
0	3-6 months	3.333333
1	6 months-1 yr	3.186567
2	< 3 months	3.481818
3	> 1 yr	2.625616
4	Never owned	4.222857
5	Occasional Commute	4.000000

Users who have never owned the EV give it the highest average rating (4.22), indicating a high level of satisfaction among this group.

Users who have owned the EV for less than 3 months also show relatively high satisfaction (average rating of 3.48).

On the other hand, users who have owned the EV for more extended periods (> 1 year) tend to give it a lower average rating (2.63), suggesting a potential decline in satisfaction over time.

Sentiment Analysis

After text processing, the reviews were converted into vectors using TFIDF and the best algorithm was found out to be Support Vector Machine which gave an accuracy of 93.5%. An accuracy score of approximately 93.50% indicates that the model correctly classified sentiment for about 93.50% of the data it was tested on. It's a good indicator of the model's overall performance,

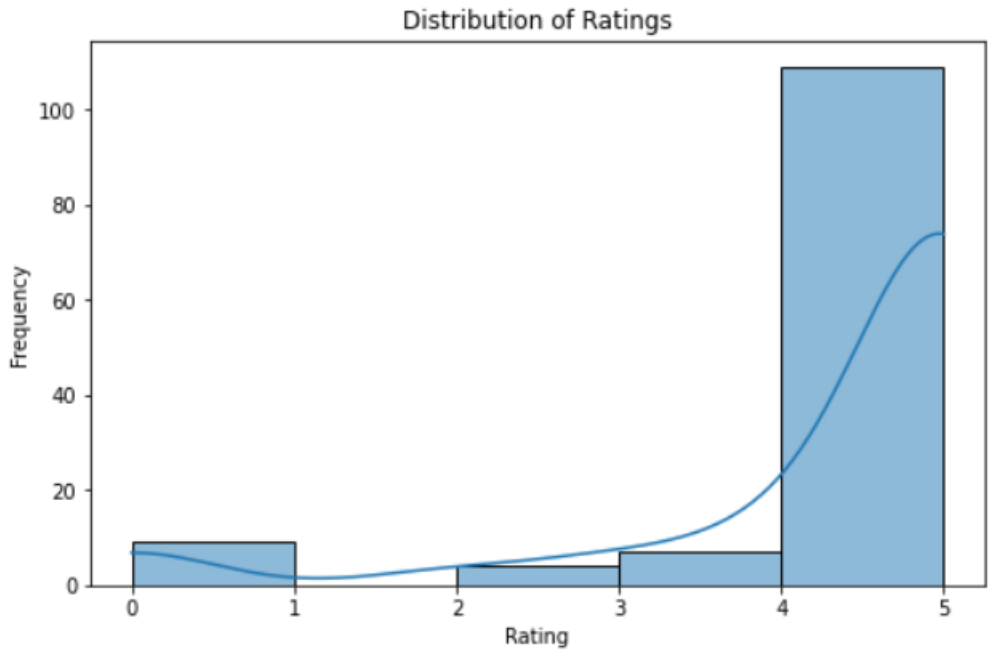
4-wheeler Electric vehicles

Dataset:

The dataset was taken from kaggle, which consisted of reviews of 4 wheeler electric vehicles from carwale website. The sample dataset is given below:

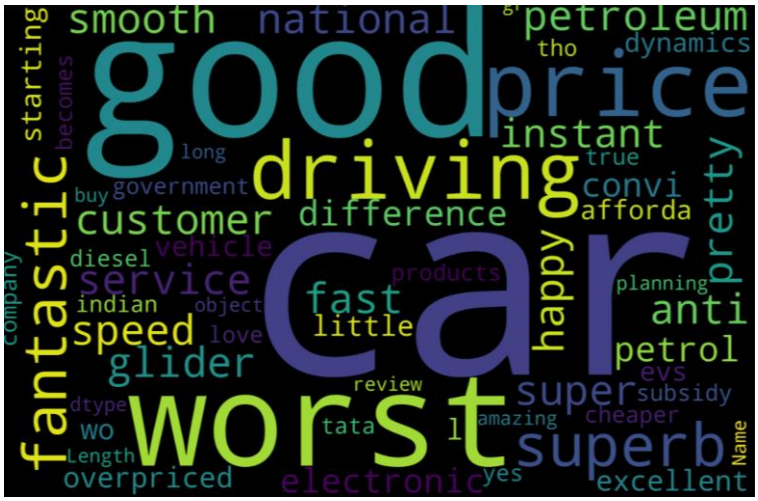
	review	Exterior	Comfort	Performance	Fuel Economy	Value for Money	Condition	driven	rating	model_name
0	Superb car like as fantastic as petroleum car....	5.0	4.0	5.0	5.0	5.0	New	Few hundred kilometers	5.0	hyundai kona
1	Anti national, worst service, worst customer c...	1.0	1.0	1.0	1.0	1.0	New	Haven't driven it	0.0	hyundai kona
2	Super happy with it. The car is too good	4.0	5.0	5.0	5.0	4.0	New	Few thousand kilometers	5.0	hyundai kona
3	Pretty good car, smooth as a glider fast car, ...	5.0	5.0	5.0	5.0	5.0	New	Few thousand kilometers	5.0	hyundai kona
4	Price difference between petrol and electronic...	4.0	4.0	5.0	3.0	2.0	Not Purchased	Haven't driven it	3.0	hyundai kona

i. Distribution of Ratings is as follows



From the above distribution, it is clear that most of the consumers have given the highest rating 5 to their electric four wheelers.

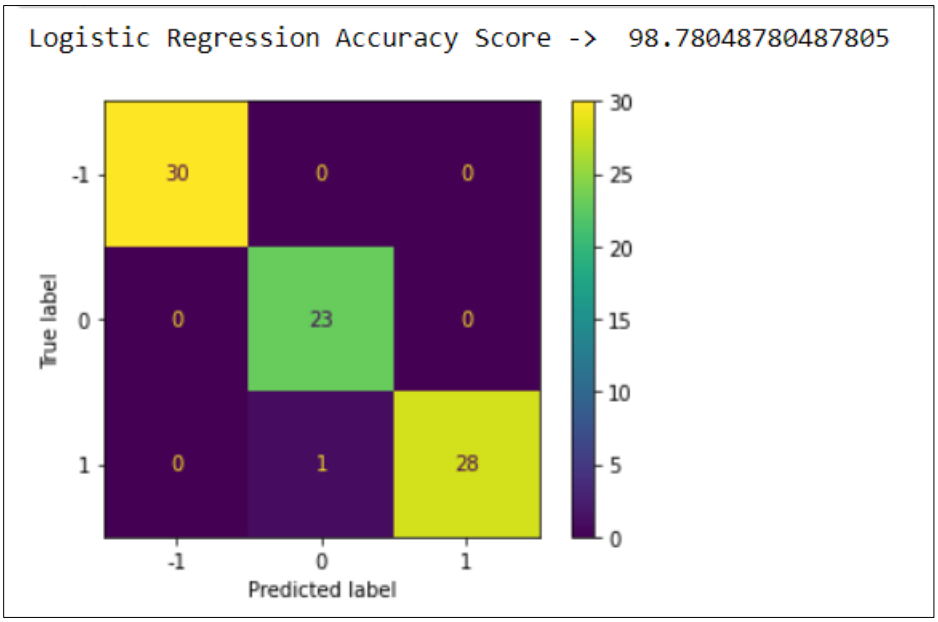
Word Cloud for the processed reviews



From the above word cloud, it is clear that most of them have given good reviews to the cars they are using. But a few of them have also given negative remarks.

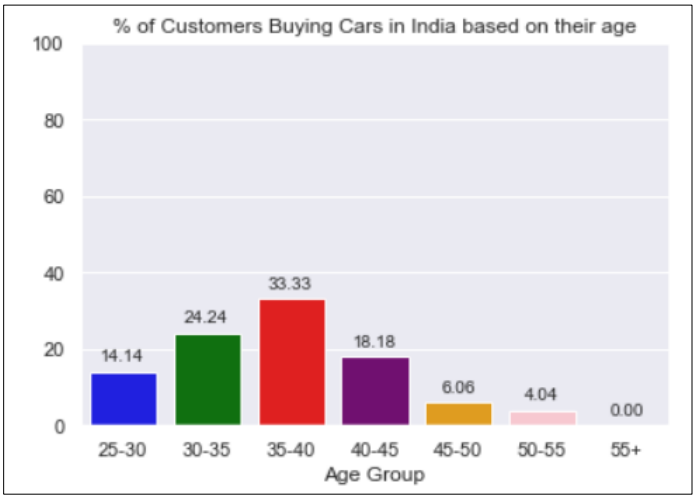
Sentiment Analysis

After text processing, the reviews were converted into vectors using TFIDF and the best algorithm was found out to be Logistic Regression which gave an accuracy of 98.8%



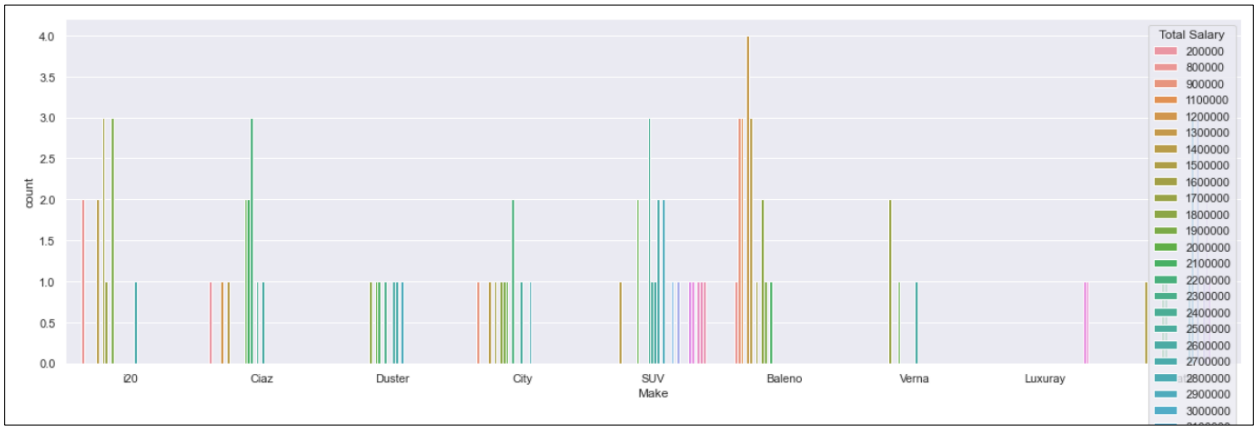
3.3 DEMOGRAPHIC ANALYSIS

ii. Relation between the age of consumers and the vehicle they buy

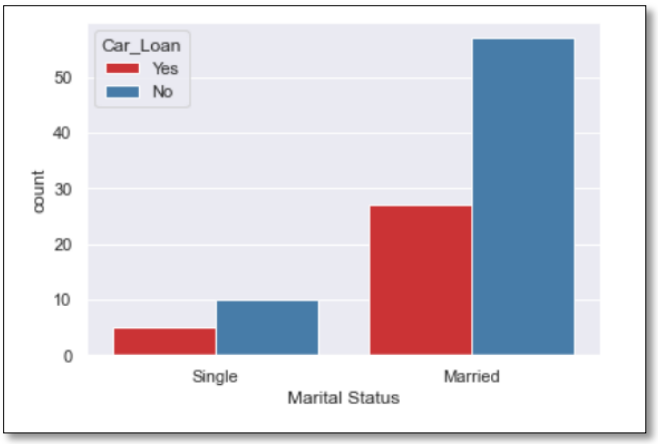


People in the age group 35-40 tend to buy electric vehicles compared to others, followed by those in their early 30s and 40s.

iii. Relation between the salary of consumer and the vehicle they buy



iv. Relation between the marital status of a consumer and them taking loan

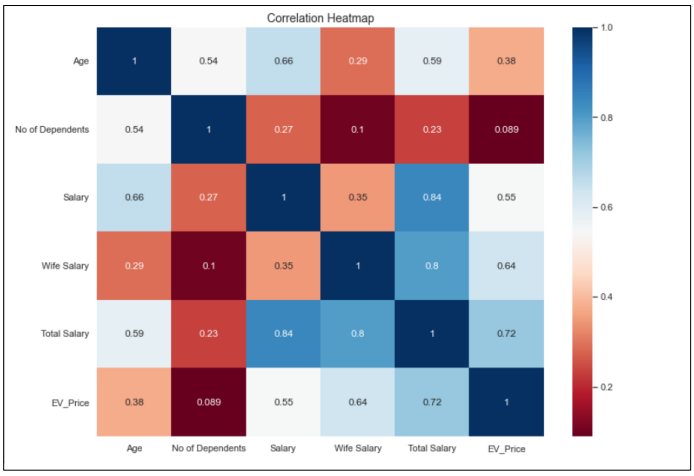


From the above bar plot, it is clear that consumers who are married most likely go for taking a loan rather than the single consumers. Overall, there are very few consumers who apply for loan.

v. Histogram plots of numeric variables

The plots above show the distribution of different numeric variables. The age variable follows normal distribution, while the other variables seem to be either positively or negatively screwed.

vi. Correlation Plot

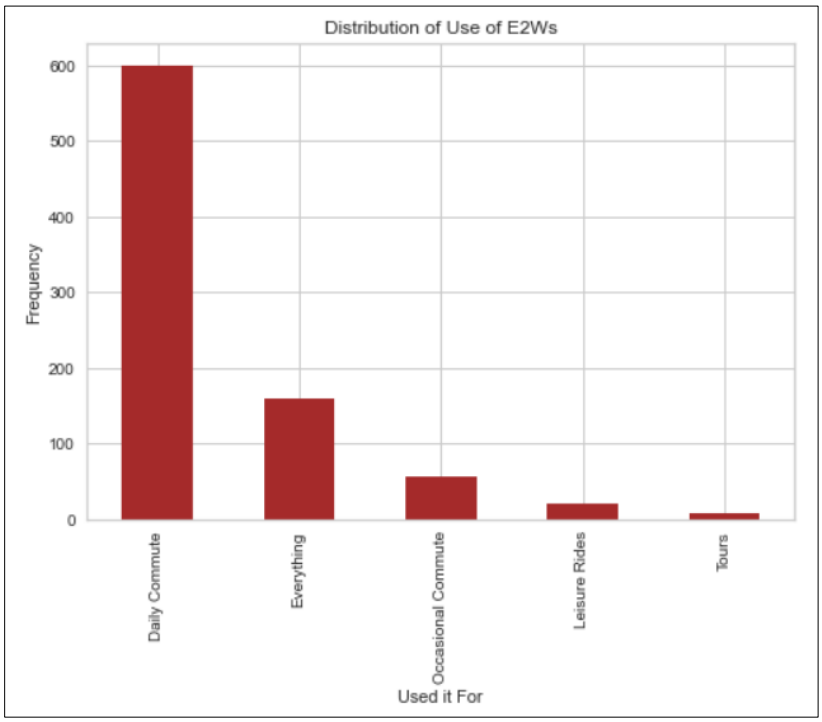


This correlation plot can clearly convey the attributes that affects the buying preference of any person.

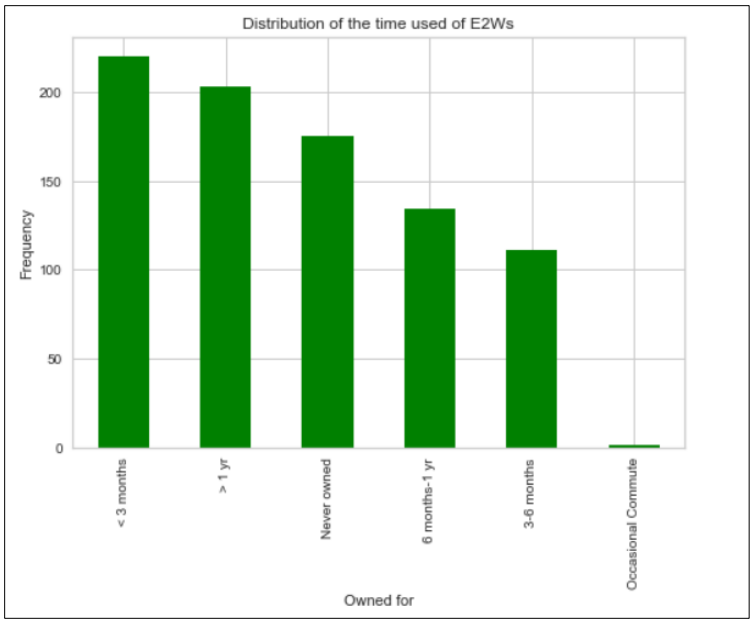
3.4 BEHAVIORIAL ANALYSIS

ELECTRIC VEHICLES(2 WHEELER)

Distribution of the purpose of using the vehicles



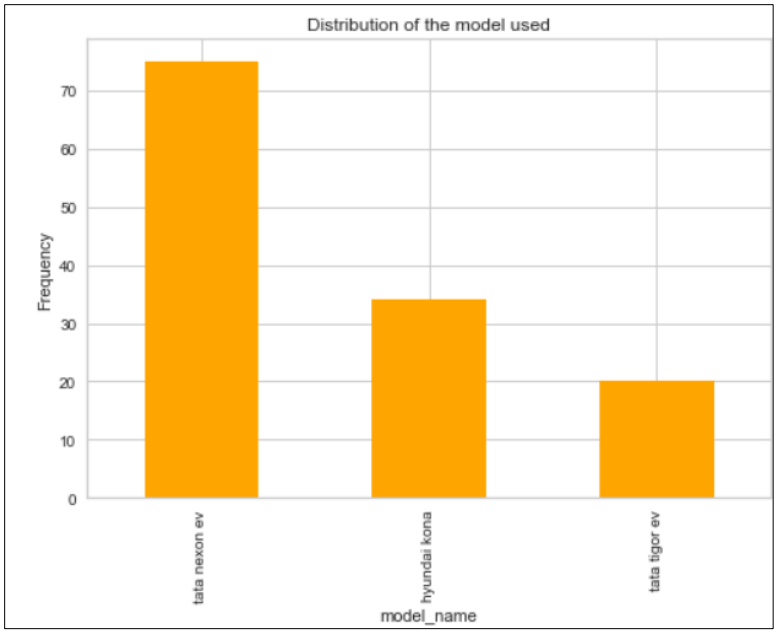
Most of the people use 2 wheeler electric vehicles for commuting, and very less for tours and leisure.



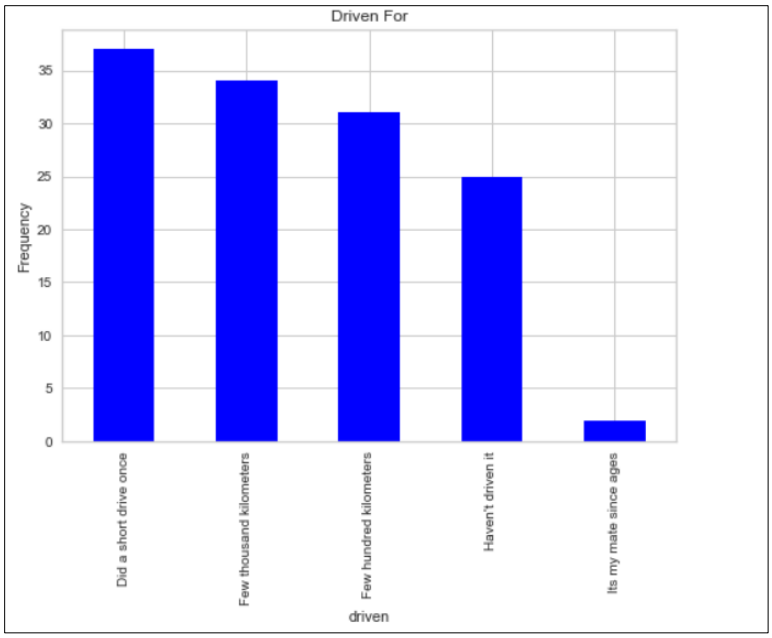
Most of the people have used it for less than 3 months, while others have used for more than 1 yr, and 175 of them have never owned.

ELECTRIC VEHICLES(FOUR WHEELER)

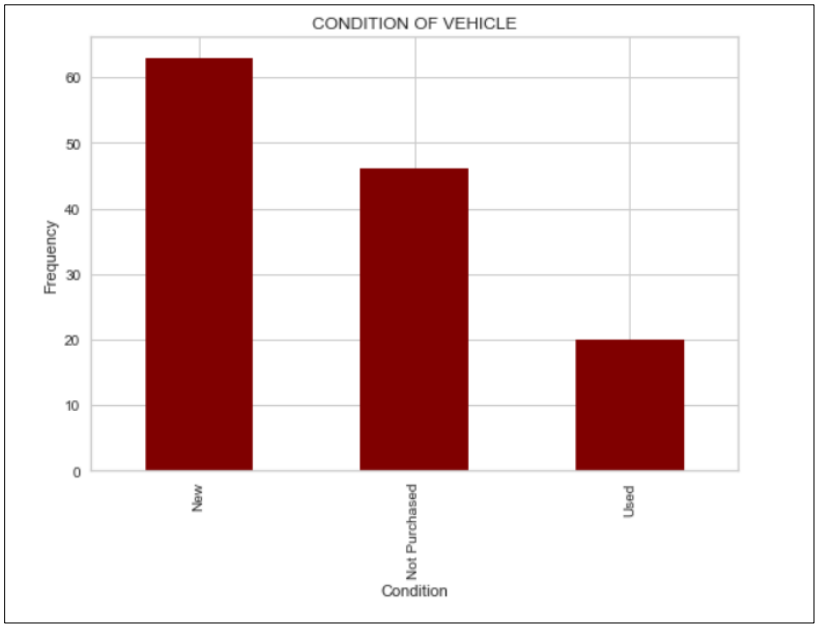
Distribution of the model used



Most of the people have Tata Nexon Ev, followed by Hyundai Kona and others.



Most of the people have used it for short drives.



For E4W's, most people own a new EV and most of them have driven for short distances only, so no long-term review is available

4. CUSTOMER SEGMENTATION

4.1 Based On Demographic Data of the Customers

Pre-processing for performing Principle Component Analysis

Encoding the Categorical Variables

Columns having categorical values are being converted into integers by using the below mentioned transformations.

Column 'Profession' has two values, 'Salaried' and 'Business', change it to '0' and '1'.

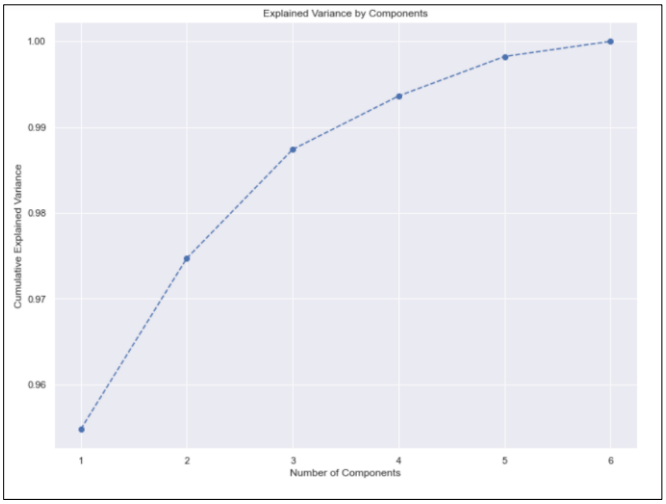
Column 'Marital Status' has two values, 'Married' and 'Single', change it to '1' and '0'.

Column 'Education' has two values, 'Post Graduate' and 'Graduate', change it to '1' and '0'.

Column 'Personal loan' has two values, 'Yes' and 'No', change it to '1' and '0'.

Column 'Car Loan' has two values, 'Yes' and 'No', change it to '1' and '0'.

PCA



	Age	Profession	Marital Status	Education	No of Dependents	Salary
Component 1	0.990836	-0.000080	-0.031754	0.005902	0.077283	0.105964
Component 2	-0.021743	-0.131426	-0.126217	-0.056037	0.865491	-0.462719
Component 3	-0.128992	0.219748	-0.069222	0.091868	0.472756	0.835669

These loadings help us understand the relationships between our original variables and the principal components. Positive loadings indicate a positive correlation with the component, while negative loadings indicate a negative correlation. PCA is often used for dimensionality reduction or for identifying important patterns and relationships in data by focusing on the most significant principal components while reducing noise or redundant information

K-MEANS CLUSTERING

K-means clustering is one of the simplest and popular unsupervised machine learning algorithms.

Typically, unsupervised algorithms make inferences from datasets using only input vectors without referring to known, or labeled, outcomes. A cluster refers to a collection of data points aggregated together because of certain similarities.

You'll define a target number *k*, which refers to the number of centroids you need in the dataset. A centroid is the imaginary or real location representing the center of the cluster.

Every data point is allocated to each of the clusters through reducing the in-cluster sum of squares. In other words, the K-means algorithm identifies *k* number of centroids, and then allocates every data point to the nearest cluster, while keeping the centroids as small as possible.

The *'means'* in the K-means refers to averaging of the data; that is, finding the centroid.

How the K-means algorithm works

To process the learning data, the K-means algorithm in data mining starts with a first group of randomly selected centroids, which are used as the beginning points for every cluster, and then performs iterative (repetitive) calculations to optimize the positions of the centroids

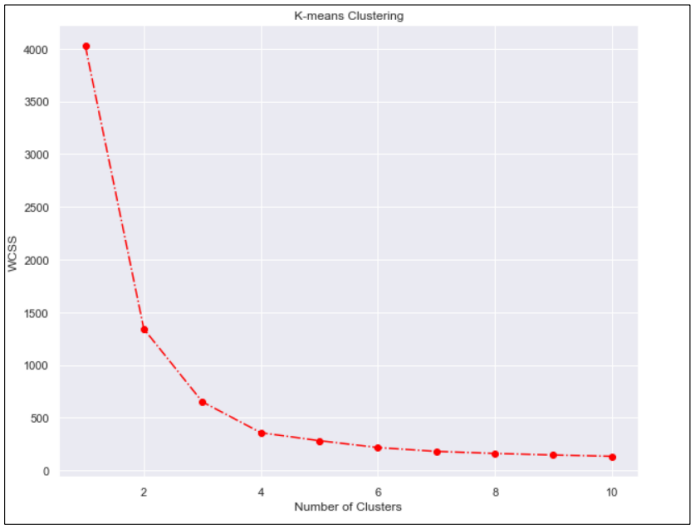
It halts creating and optimizing clusters when either:

The centroids have stabilized — there is no change in their values because the clustering has been successful.

The defined number of iterations has been achieved.

Elbow Method for finding the No. of Clusters

In the Elbow method, we are actually varying the number of clusters (K) from 1 – 10. For each value of K, we are calculating WCSS (Within-Cluster Sum of Square). WCSS is the sum of the squared distance between each point and the centroid in a cluster. When we plot the WCSS with the K value, the plot looks like an Elbow. As the number of clusters increases, the WCSS value will start to decrease. WCSS value is largest when K = 1. When we analyze the graph, we can see that the graph will rapidly change at a point and thus creating an elbow shape. From this point, the graph moves almost parallel to the X-axis. The K value corresponding to this point is the optimal value of K or an optimal number of clusters.

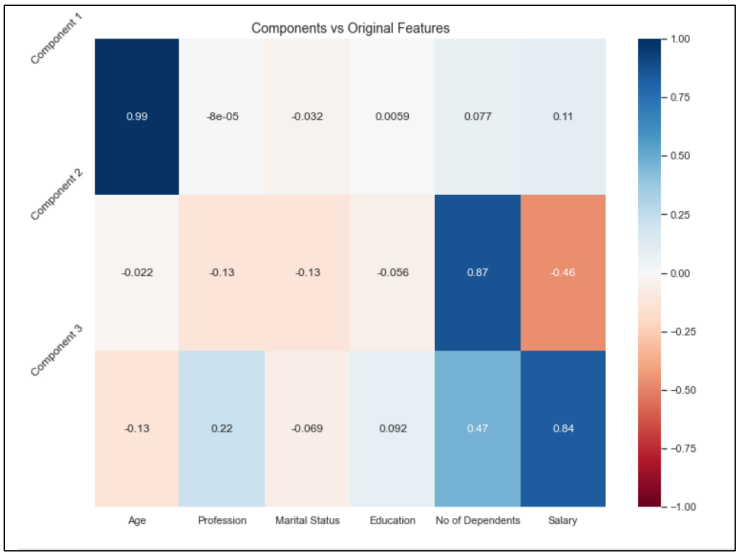


From the above graph, it is clear that the ideal no. of clusters for segmenting the customers is 3.

PCA with K-Means for Better Visualization

What we will do here is apply dimensionality reduction to simplify our problem.

We will choose reasonable components in order to obtain a better clustering solution than with the standard K-Means. So that we aim to see a nice and clear plot for our segmented groups.



We see that there is a positive correlation between Component1 and *Age, Salary and no. of dependents*. These are strictly related to the career of a person. So this component shows the career focus of the individual.

For the second component *No. of dependents* are by far the most prominent determinants.

For the final component, we realize that *Profession, No. of dependents and Salary* are the most important features. Now, we have an idea about our new variables (components). We can clearly see the relationship between components and variables.

Segment K-means PCA	Age	No of Dependents	Salary	Wife Salary	Total Salary	Price	Component 1	Component 2	Component 3
Young Singles with Moderate Income	29.310345	0.827586	1.241379e+06	258620.689655	1.500000e+06	1.024483e+06	-7.097103	-0.320039	-0.157803
Established Families with High Income	44.464286	2.964286	2.342857e+06	660714.285714	3.003571e+06	1.407143e+06	8.220697	-0.098491	-0.008997
MIddle-Aged Families with Moderate Income	35.714286	2.595238	1.673810e+06	640476.190476	2.314286e+06	1.169048e+06	-0.580084	0.286640	0.114958

These are the 3 segments which we get after segmentation using K-Means Clustering

1. **Young Singles with Moderate Income:**

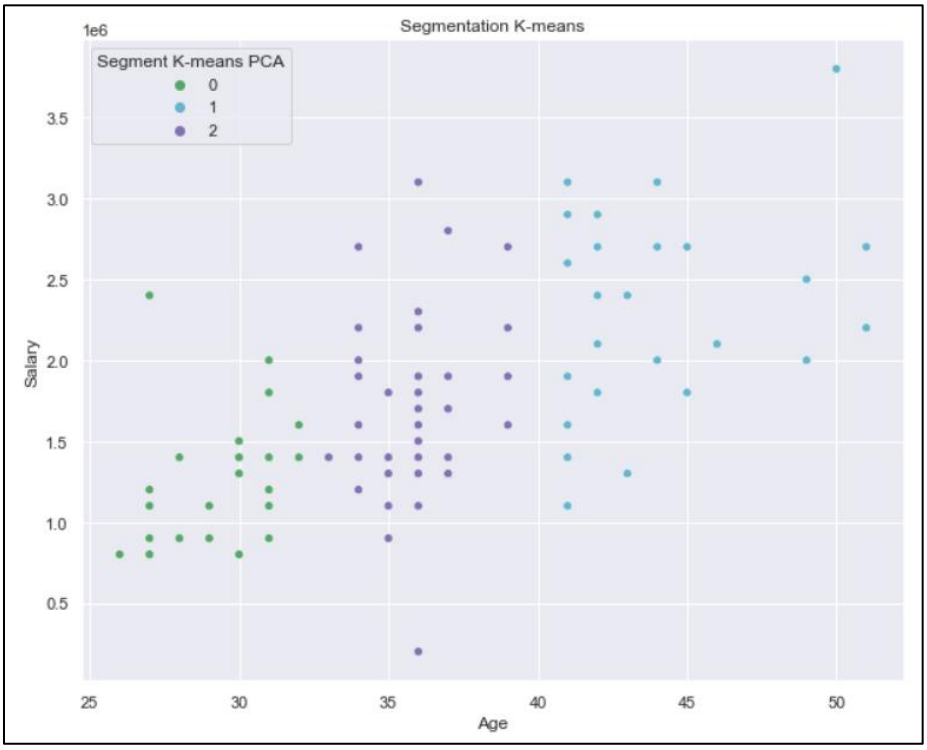
   This segment appears to consist of younger individuals with few dependents, and they have a moderate total income and spend relatively less.

2. **Established Families with High Income:**

   This segment seems to include older individuals with families and a high total income, and they spend on average around $1.4 million.

3. **Middle-Aged Families with Moderate Income:**

   This segment is made up of middle-aged individuals with families and a moderate total income, and they spend approximately $1.2 million



Segmentation helps marketers to be more efficient in terms of time, money and other resources. They gain a better understanding of customer's needs and wants and therefore can tailor campaigns to customer segments most likely to purchase products.

Target Segments

Targeting the right segment for increasing electric vehicle sales depends on your specific marketing and product strategies, but here are some considerations:

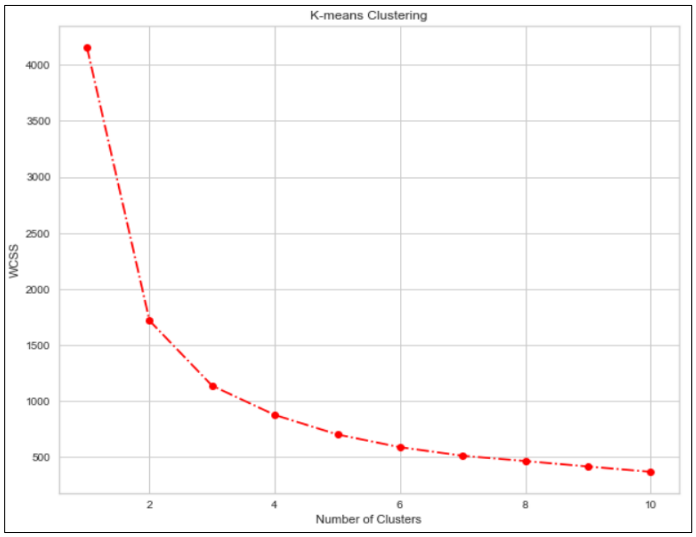
- **Segment 1** appears to be a promising target for electric vehicle sales. This segment has a higher average total salary, and the individuals are older, which may indicate higher purchasing power. Moreover, the PCA components suggest positive aspects for this segment.
- **Segment 2** could also be a good target. Although the total salary is slightly lower than in Segment 1, it's still relatively high, and the PCA components show some positive characteristics.
- **Segment 0** has the lowest average total salary and the youngest age, which might make them less likely to afford electric vehicles.

Ultimately, the choice of segment will depend on your product offerings, pricing, and marketing strategy. It's often useful to conduct further market research and customer profiling to better understand the preferences and behaviors of these segments and align your strategy accordingly.

4.2 **Based on Behavioral Characteristics**

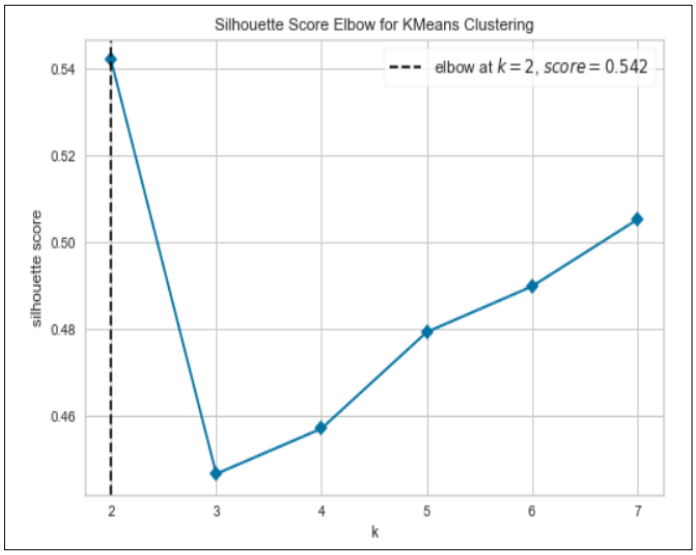
TWO-WHEELER ELECTRIC VEHICLES

1. Elbow Method



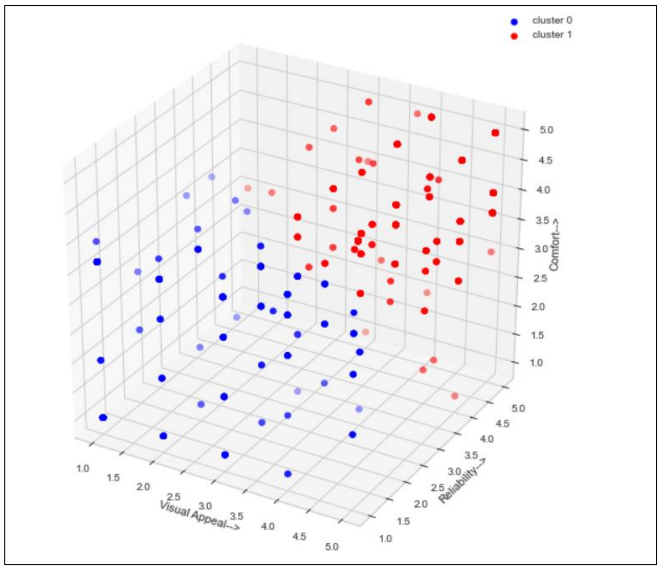
The curve shows that the ideal no. of clusters has to be 2.

2. Silhouette Score



The choice of 2 clusters is correct, since the Silhouette Score is the highest for the same.

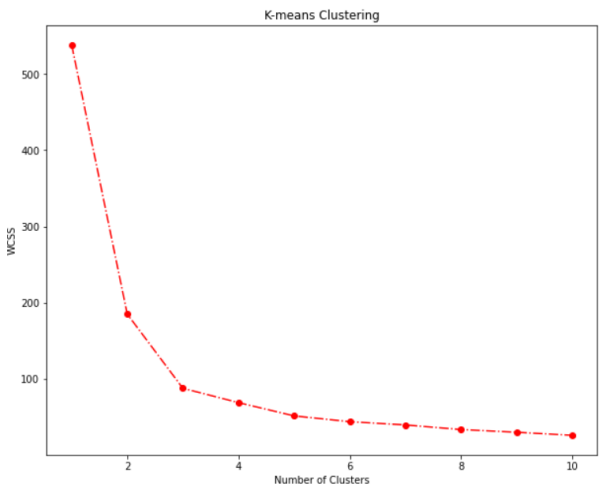
3. Cluster Plot



The data has been segmented into two clusters based on their ratings with respect to visual appeal, comfort and reliability(high v/s low).

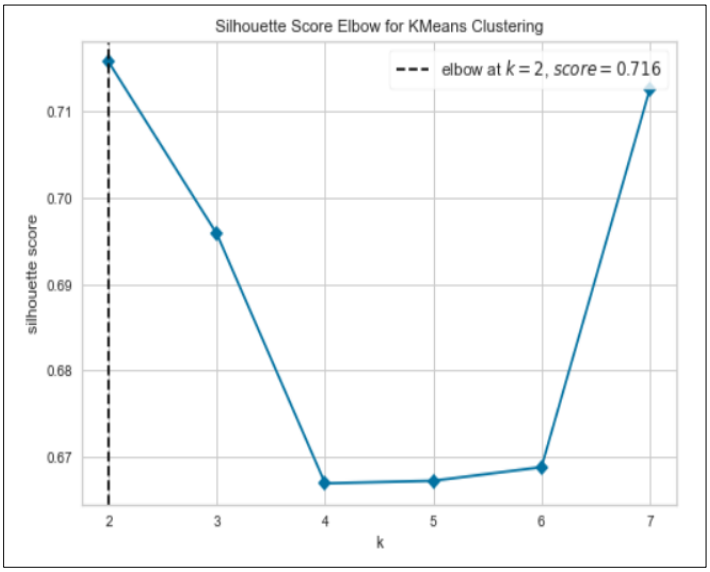
FOUR-WHEELER ELECTRIC VEHICLES

1. Elbow Method



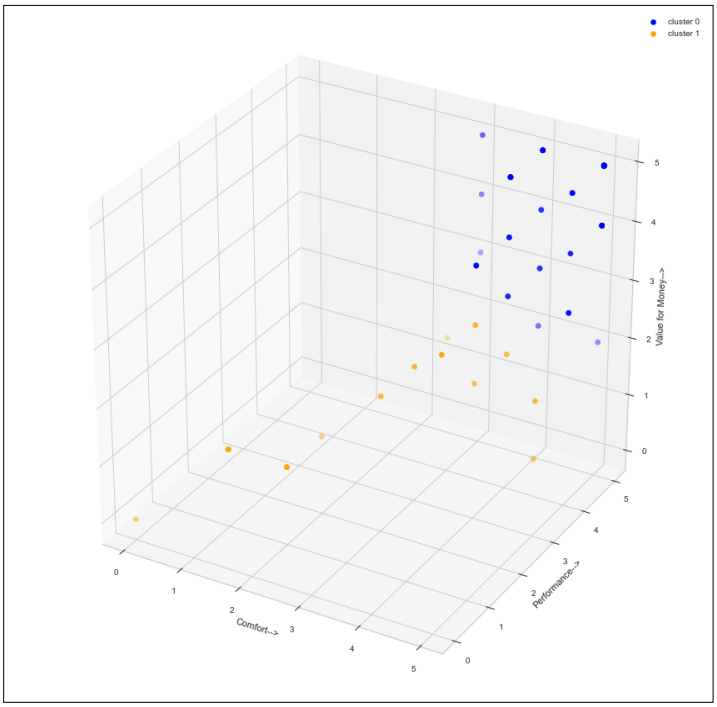
The curve shows that the ideal no. of clusters has to be 2.

2. Silhouette Score



The choice of 2 clusters is correct, since the Silhouette Score is the highest for the same.

3. Cluster Plot



The two clusters are separated on the basis of how people have rated the electric vehicles- High value for money and low value for money.

5. MARKETING MIX

Without knowing what the customer needs and positioning the product correctly in the customer's mind, product design is unsuccessful. Global warming has altered the climate today. For these reasons, car owners concentrate on reducing their fuel costs and protecting the environment. To maintain ongoing growth, it's critical to differentiating your goods. Consumers will be able to distinguish these products from those of their rivals thanks to this strategy. This strategy will persuade customers to cut costs while also guaranteeing a clean and healthy atmosphere.

a) PRODUCT STRATEGY

Our goal is to produce high-end, battery-powered electric cars that are environmentally beneficial to save the environment. They also have a remarkable impact on the economy. Therefore, a strategy to provide them with this commodity will benefit the economy as well as the environment as a whole.

An electric vehicle (EV) would let you charge the batteries either by plugging it directly into a wall socket, which may take approximately 12 hours, or by using one of the fast-charging stations, which completes the task in about 20 to 30 minutes.

b) PRICING STRATEGY

Make a poll to learn the appropriate pricing the consumer can afford. We must choose a pricing that will undoubtedly result in a profit. The market's ongoing competition will force the company to decrease its rates in order to survive.

Extending the guarantee period can be competitive pricing strategies. In any case, since middle-class workers must always keep costs to a minimum in order to contribute in other ways, the mental pricing technique is still appropriate for them. These costs are affordable for the intended customers.

c) PROMOTION STRATEGY

After building a car, the corporation must guarantee that the target consumer is sufficiently knowledgeable about the product. To create efficient advertising and marketing efforts that draw in a sizable portion of their target consumer base, businesses must have a thorough understanding of the demands and lifestyle of their target audience. Electric car firms must assess a market's size, profitability, trend, and growth rate in order to comprehend the shifting opportunities and risks the industry brings**.**

We will use billboards, radio, television, and the internet as our primary advertising platforms. Notably, using internet marketing techniques will lower the cost of merchandise. Today, you may utilise technologies like Facebook, Twitter, and your company website to promote your product. The World Cup and the Olympics, as well as international environmental conferences, will provide excellent platforms for promoting the electric automobile.

d) PLACE STRATEGY

The ultimate decision of the buyer is influenced by the dealerships' proximity to the customer. Therefore, we need to establish strong customer relationships and link dealers and customers. We can offer to have the car delivered to the customer's location upon request. Run Facebook advertisements to the companies in the targeted areas.

REFERENCES

- https://github.com/BairagiSaurabh/Electric-Vehicle-Market-Segmentation
- https://github.com/deepika-prabakaran/FEYNN-LAB-EV-ANALYSIS
- https://nzlul.medium.com/clustering-method-using-k-means-hierarchical-and-dbscan-using-python-5ca5721bbfc3
- https://www.slideteam.net/blog/marketing-mix-ppt-templates-to-create-an-unbeatable-marketing-strategy
- https://entrackr.com/2022/09/the-landscape-of-ev-startups-in-india-entrackr-report/