Electric Vehicle Market Segmentation Analysis

Team

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INTRODUCTION

The automotive industry is experiencing a transformative shift towards sustainable and eco-friendly transportation solutions. At the forefront of this revolution are Electric Vehicles (EVs), representing a paradigm shift from traditional internal combustion engines to electric propulsion systems. The growing adoption of EVs is driven by a confluence of factors, including environmental consciousness, regulatory incentives, and technological advancements in battery technology.

Understanding the diverse preferences and needs of consumers within the EV market is imperative for automakers, policymakers, and stakeholders alike. Market segmentation emerges as a pivotal tool in this endeavor, enabling a deeper comprehension of the distinct customer segments, their preferences, and purchase behaviors.

This study aims to delve into the intricacies of EV market segmentation, seeking to identify and categorize consumer groups based on a range of demographic, psychographic, and behavioral variables. By delineating these segments, we aim to provide valuable insights that can inform marketing strategies, product development, and policy initiatives tailored to the unique needs of each segment.

MARKET OVERVIEW

The Electric Vehicle (EV) market in India has witnessed significant growth and transformation in recent years, driven by a confluence of factors including environmental awareness, government policies, and technological advancements. This section provides a comprehensive overview of the current state of the EV market in India, highlighting key trends, policies, and market players.

Market Size and Growth:

As of 2023, the Indian EV market has experienced substantial growth, with the total number of electric vehicles on the road surpassing 1.3 million units. This represents a 151% increase from the previous year, underscoring the accelerating adoption of electric mobility solutions in the country. The market is projected to continue its upward trajectory in the coming years, with estimates suggesting a 46.5% compound annual growth rate (CAGR) till 2030.

Government Policies and Initiatives:

The Indian government has played a pivotal role in fostering the growth of the EV market through a series of targeted policies and initiatives. Notable among these is the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme, which provides financial incentives, subsidies, and grants to both manufacturers and consumers. Additionally, state-specific policies and exemptions further incentivize the adoption of electric vehicles.

Charging Infrastructure:

The development of a robust charging infrastructure is fundamental to the widespread adoption of electric vehicles. As of 2023, India has witnessed a substantial increase in the number of public charging stations, with a total of 8029 stations across 777 cities. Efforts are underway to further expand this network, with plans to install a total of 1.32 million charging stations by 2030.

Key Market Players:

The Indian EV market boasts a diverse landscape of manufacturers, ranging from established automotive giants to innovative startups. Notable players include Tata Motors, Mahindra Electric, Aether Energy, etc, each contributing to the market with a unique portfolio of electric vehicles catering to different segments and preferences.

Consumer Adoption and Trends:

Consumer attitudes towards electric vehicles are evolving, driven by a growing awareness of environmental sustainability and the benefits of electric mobility. Factors influencing purchasing decisions include range, charging infrastructure availability, and government incentives. Notably, the urban demographic, particularly in metropolitan areas, has shown a strong inclination towards adopting electric vehicles for daily commuting.

Future Outlook:

With a favorable policy environment, advancing technology, and a burgeoning ecosystem of market players, the outlook for the Indian EV market is optimistic. Anticipated advancements in battery technology, coupled with economies of scale, are expected to drive down costs, making electric vehicles more accessible to a wider consumer base.

FERMI ESTIMATION

Demographic Analysis:

1. Population:
   - India's population: ~1.41 billion (as of 2023)
   - Estimated urban population: ~35%
   - Estimated rural population: ~65%

2. Income Levels:
   - High-income group (top 10%): ~140 million people
   - Middle-income group (middle 40%): ~560 million people
   - Low-income group (bottom 50%): ~700 million people

3. Education Levels:
   - Literacy rate in India: ~77% (as of 2022)
   - Estimated literate population: ~1.04 billion

Psychographic Analysis:

1. Consumer Awareness and Perception:
   - Awareness of electric vehicles: ~50%
   - Positive perception of EVs: ~30%
   - Concerns about charging infrastructure: ~70%
   - Environmental consciousness: ~40%

2. Lifestyle and Values:
   - Eco-conscious consumers (willing to pay premium for sustainability): ~15%
   - Pragmatic consumers (interested in lower cost of ownership): ~30%
   - Early adopters of technology: ~25%
   - Traditionalists (prefer conventional vehicles): ~30%

Behavioral Analysis:

1. Purchase Behavior:
   - New car buyers in a year: ~3 million (as of 2023)
   - Potential early adopters of EVs: ~10% of new car buyers (300,000)

2. Usage Patterns:
   - Average annual mileage of a car: ~15,000 km
   - Commuters: ~60% of car owners
   - Occasional users: ~40% of car owners

3. Brand Loyalty and Switching:
   - Estimated brand-loyal customers: ~60%
   - Willingness to switch to EVs for next purchase: ~20%

Geographical Analysis:

1. Urban vs. Rural:
   - Urban population: ~490 million
   - Urban areas with potential EV market: ~50 major cities

2. Charging Infrastructure:
   - Public charging stations: 8029 (as of 2023)
   - Estimated needed charging stations for decent coverage: 1 million (by 2030)

3. Government Policies:
   - Subsidies and incentives for EV buyers: Available
   - State-wise variations in policies and incentives

DATA COLLECTION

https://github.com/Kshitij-2107/EV-Market-Segmentation/blob/abf0b9f08a6b5f99c4a7c7240d51c10acc1517c5/car.csv

https://github.com/wahid-irfan/EV-MARKET-GEOGRAPHIC-SEGMENTATION-IRFAN/blob/594fecfc53621671af6b9ff0efcb6a5c78056871/CS_Highway.csv

https://github.com/wahid-irfan/EV-MARKET-GEOGRAPHIC-SEGMENTATION-IRFAN/blob/594fecfc53621671af6b9ff0efcb6a5c78056871/CS_Sanctioned.csv

https://github.com/Atifbeast/Feynn-Internship-Project_02-implementation/blob/a114b52d05a87db5116e3a901dae9523d4d429b8/cardetail.csv

https://github.com/aniketbmankar/Electric_Vehicle_Segmentation/blob/d7a7b0bf3c553f2f3d09f699c879c610c236f43a/ElectricCarData.csv

DATA PREPROCESSING

Steps taken to preprocess the scrapped raw data:
1) Ordinal Encoding
2) Label Encoding
3) Standard Scaler

Certain libraries are used that are required in performing Data Analysis. They are:
1) Numpy
2) Pandas
3) Matplotlib
4) Seaborn
5) Scikit learn

MARKET SEGMENTATION ANALYSIS:

We have worked on a total of 4 groups of datasets. Each data set gave different analytical report.

Dataset 1
(by Kshitij Jadhav)

	review	Exterior	Comfort	Performance	Fuel Economy	Value for Money	Condition	driven	rating
0	Need to improve body style.It's amazing and dr...	5.0	5.0	5.0	5.0	5.0	New	Few thousand kilometers	5.0
1	Tata EV has lot of flaws, worst part is servic...	3.0	2.0	1.0	2.0	1.0	New	Few thousand kilometers	0.0
2	Very nice car , environmental friendly i like ...	5.0	5.0	5.0	5.0	5.0	New	Few thousand kilometers	5.0
3	Company did not provide slow charging station ...	2.0	2.0	1.0	1.0	1.0	New	Haven't driven it	0.0
4	Servicing and maintenance overall good and goo...	5.0	5.0	5.0	5.0	5.0	Not Purchased	Few hundred kilometers	5.0

Exploratory Data Analysis:
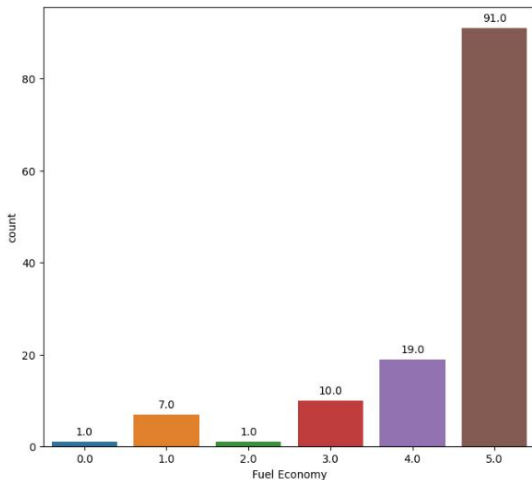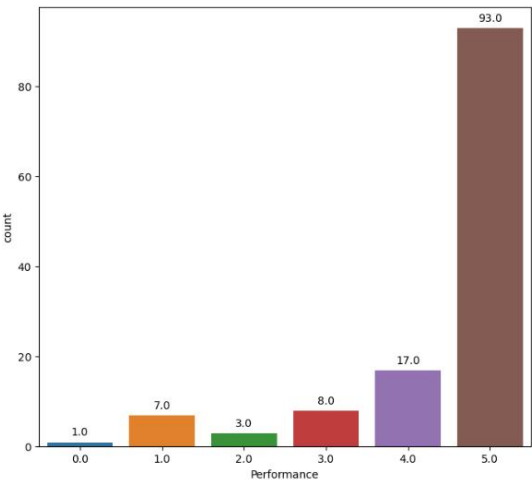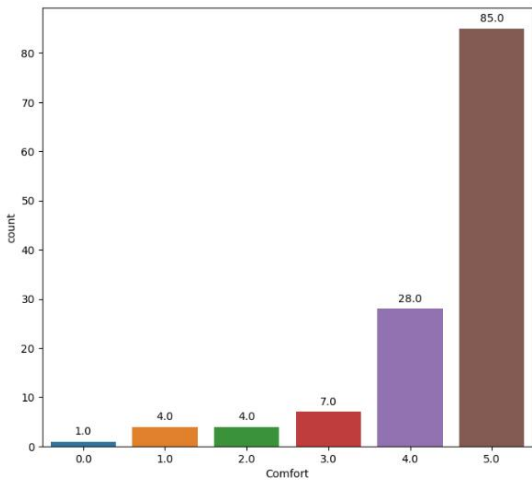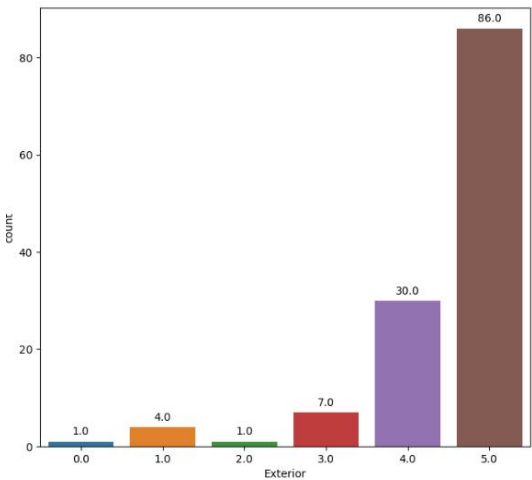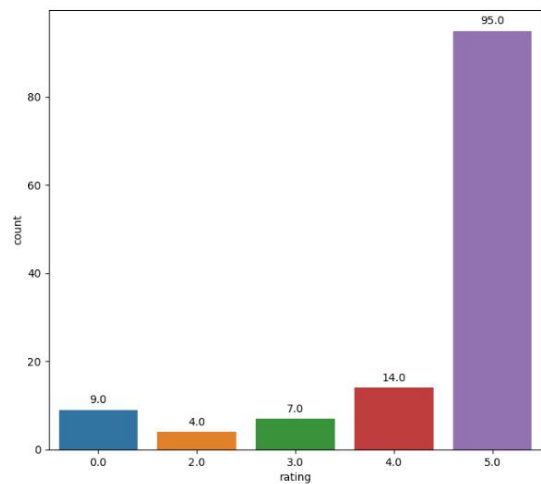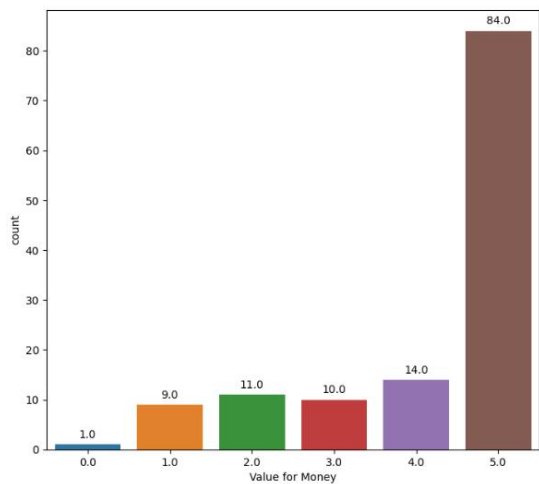
People seem to be very positive about every aspect of EVs.

PCA:

|	PC1	PC2	PC3	PC4	PC5
Exterior	-0.370159	0.504832	0.269510	0.385271	0.622139
Comfort	-0.413099	0.423520	0.139751	0.193792	-0.769997
Performance	-0.461816	0.133287	0.080588	-0.865190	0.117949
Fuel Economy	-0.437811	-0.063993	-0.880245	0.152519	0.078310
Value for Money	-0.536078	-0.737506	0.355679	0.205413	-0.001794
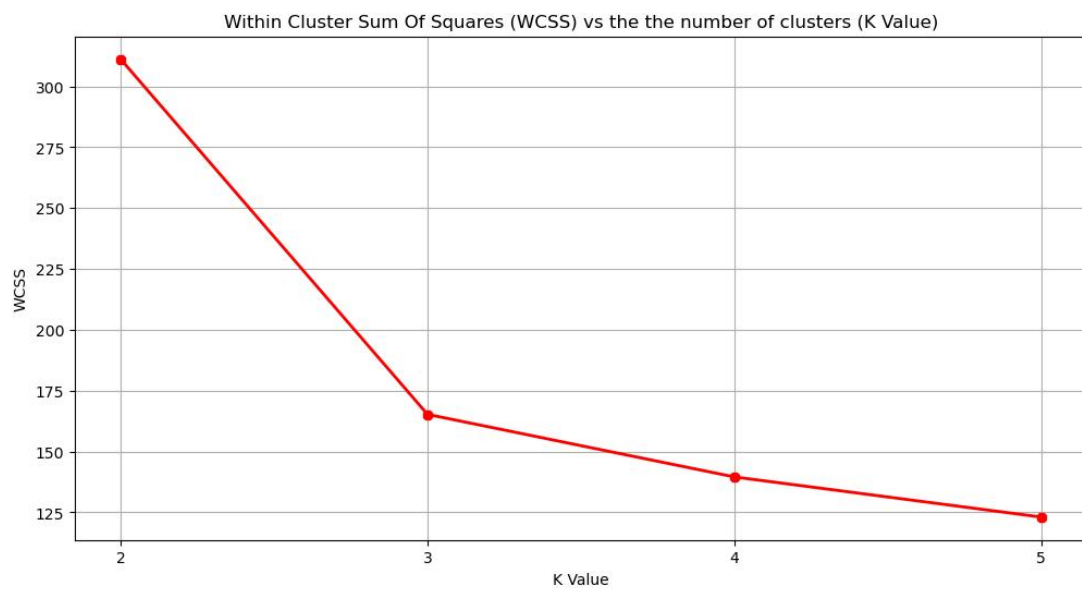
We see an elbow at 3

Silhouette Score:

Silhouette analysis for KMeans clustering on sample data with n_clusters = 3
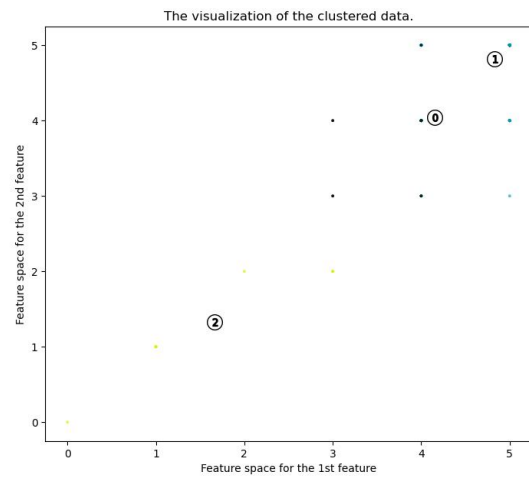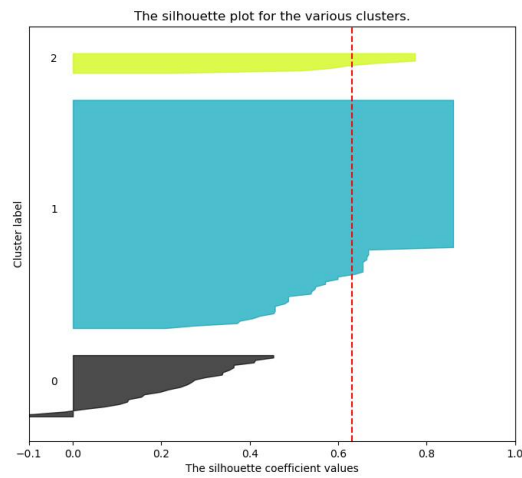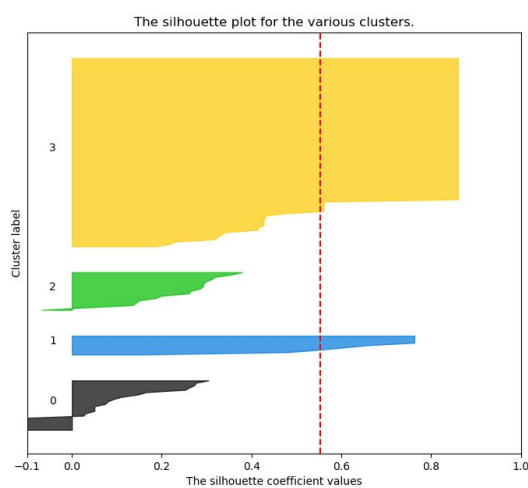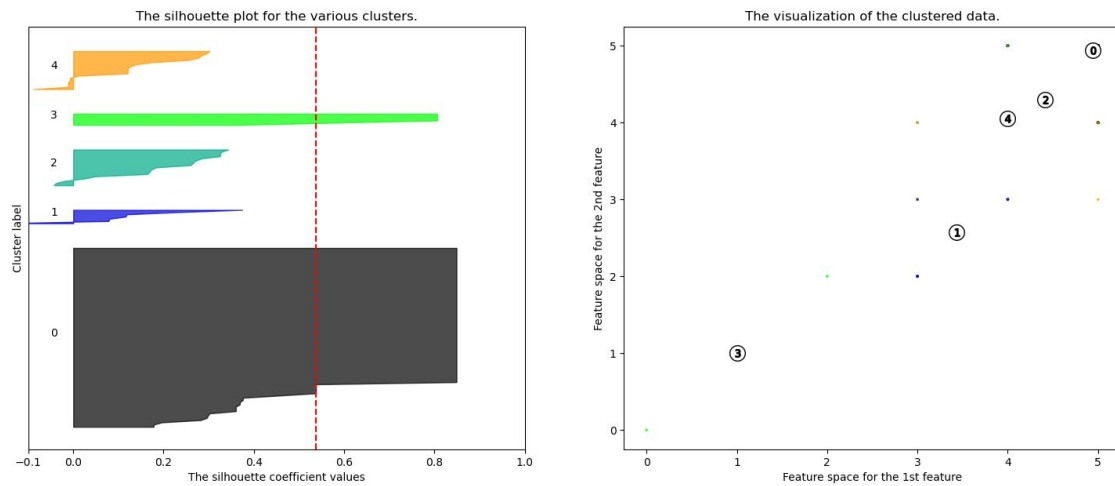

Silhouette analysis for KMeans clustering on sample data with n_clusters = 2
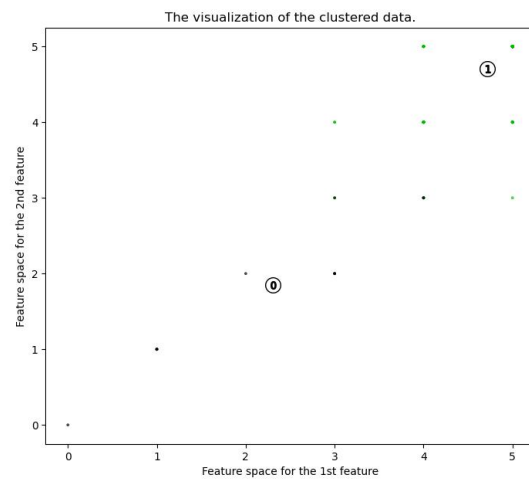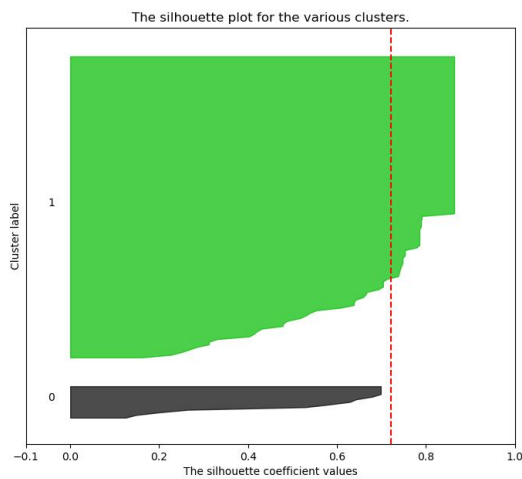
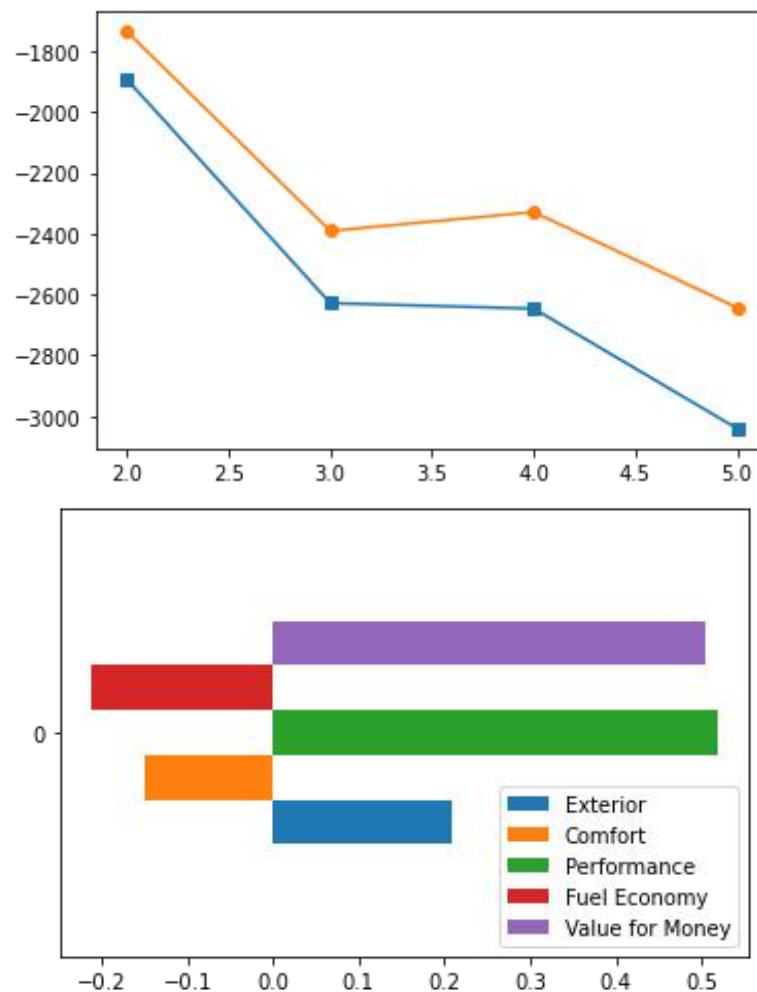### Silhouette analysis for KMeans clustering on sample data with n_clusters = 4
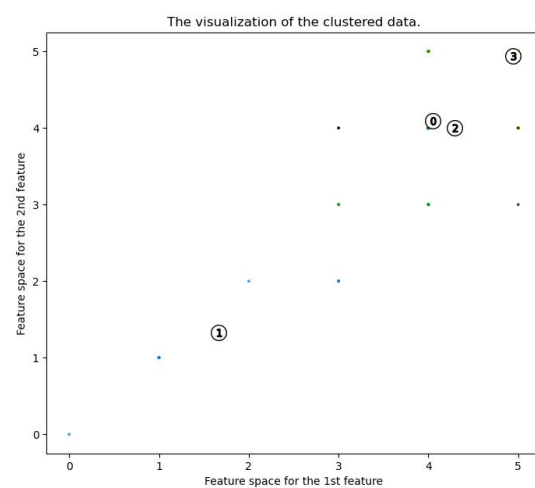
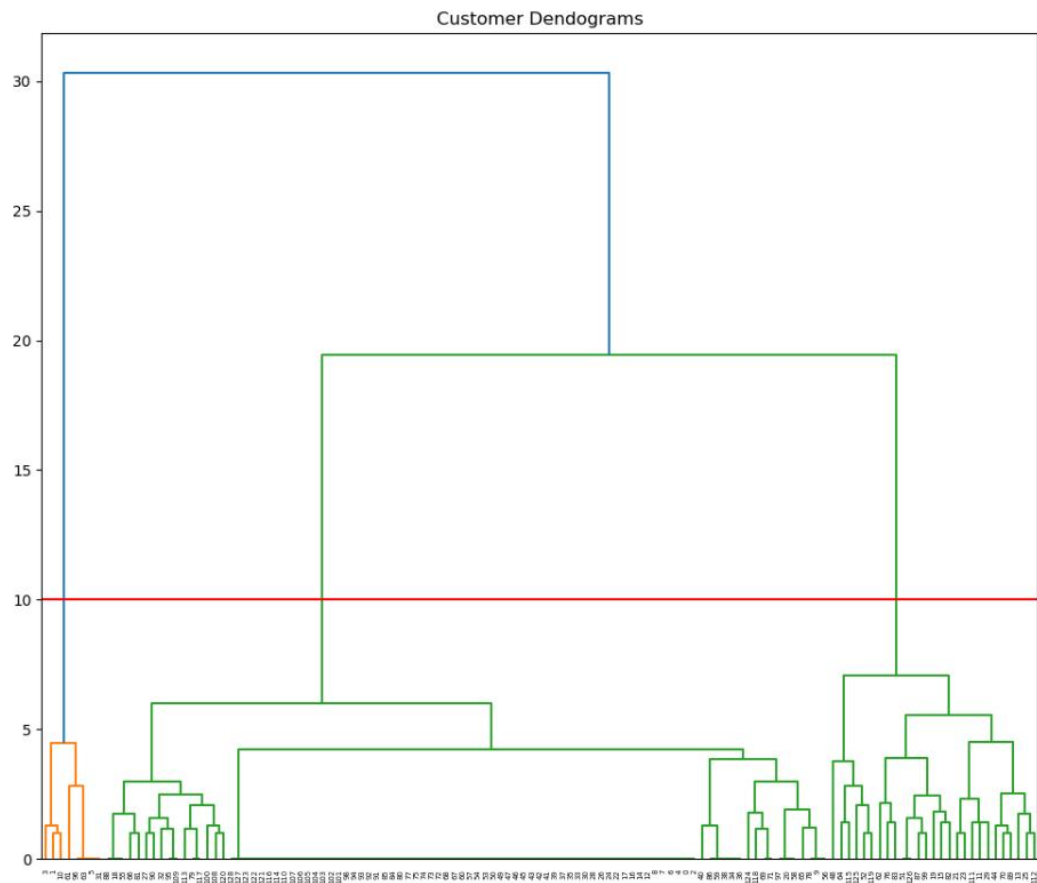Silhouette analysis for KMeans clustering on sample data with n_clusters = 5

Number of clusters given by silhouette plot is 2
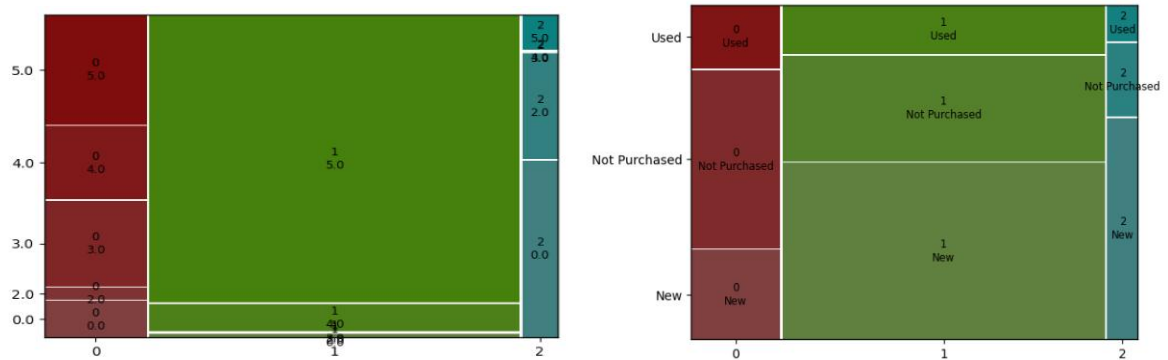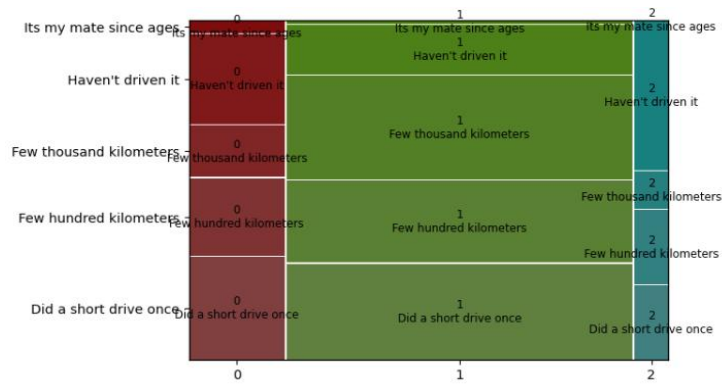
Using mixtures of Regression models:
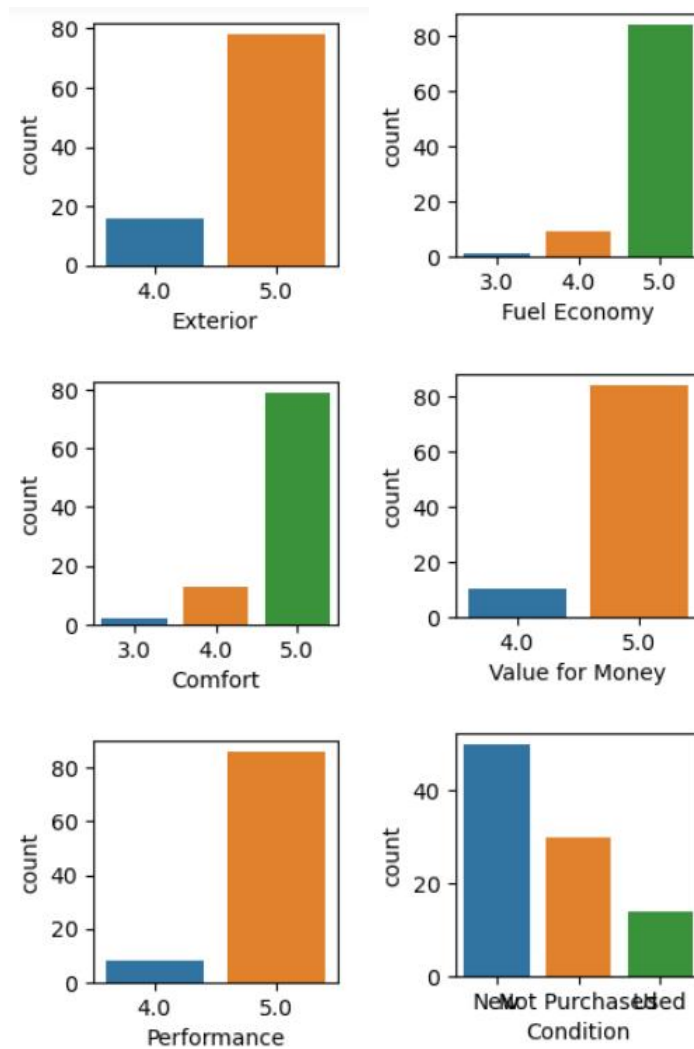
Profiling Segments:

Customer Dendograms

Number of clusters given by dendograms is 3
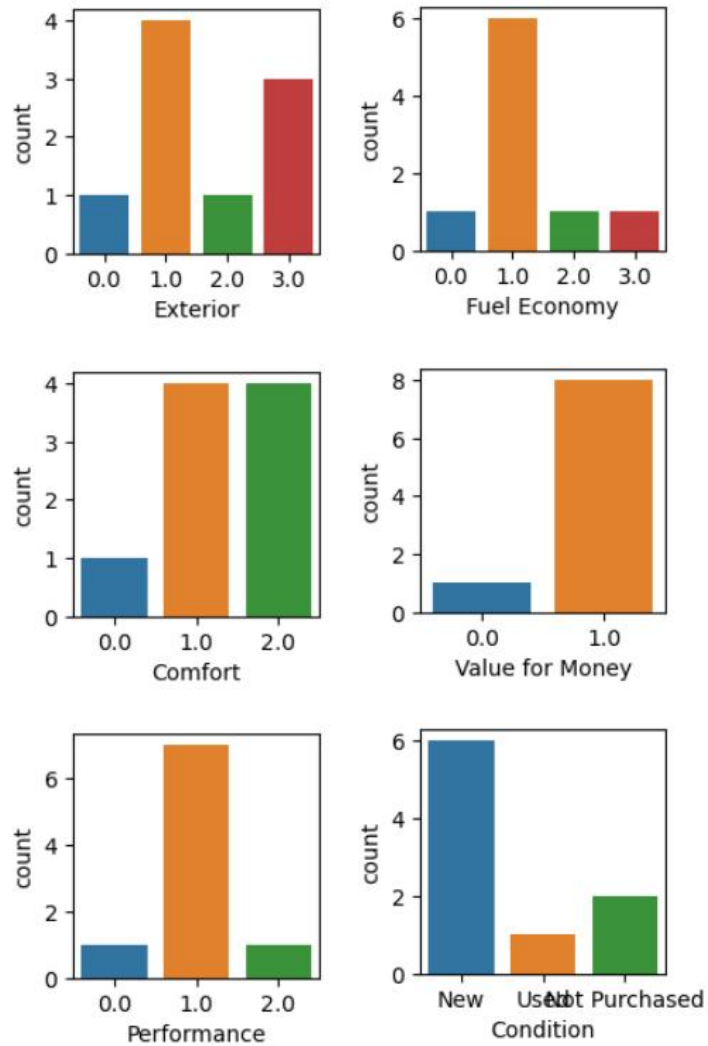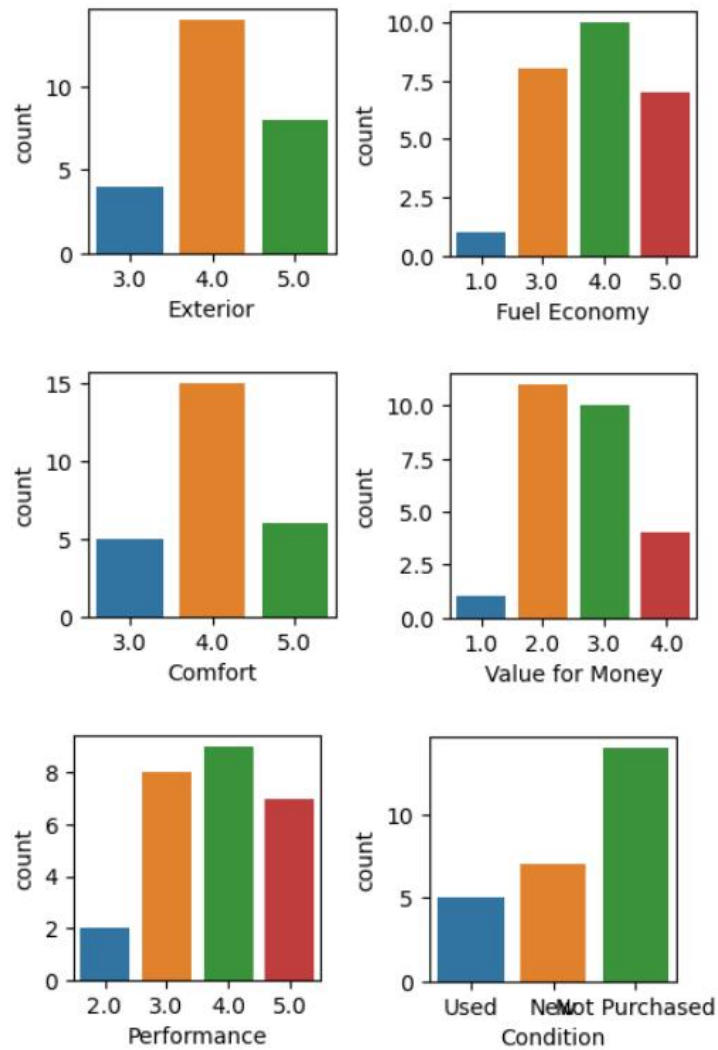
Describing Segments:

Interpret the Clusters:

First Cluster contains customers with positive reviews for all properties and most of them have new EVs but haven't driven them much

Second Cluster contains customers with negative reviews for all properties and have purchased new EVs but haven't driven them much!

Third Cluster contains customers who are satisfied with Exterior and Comfort but have mixed reviews for other properties and most of them haven't purchased an EV!

Perhaps this is the segment that can be targeted and change their perception they have towards an EV.

Visualizing Clusters:
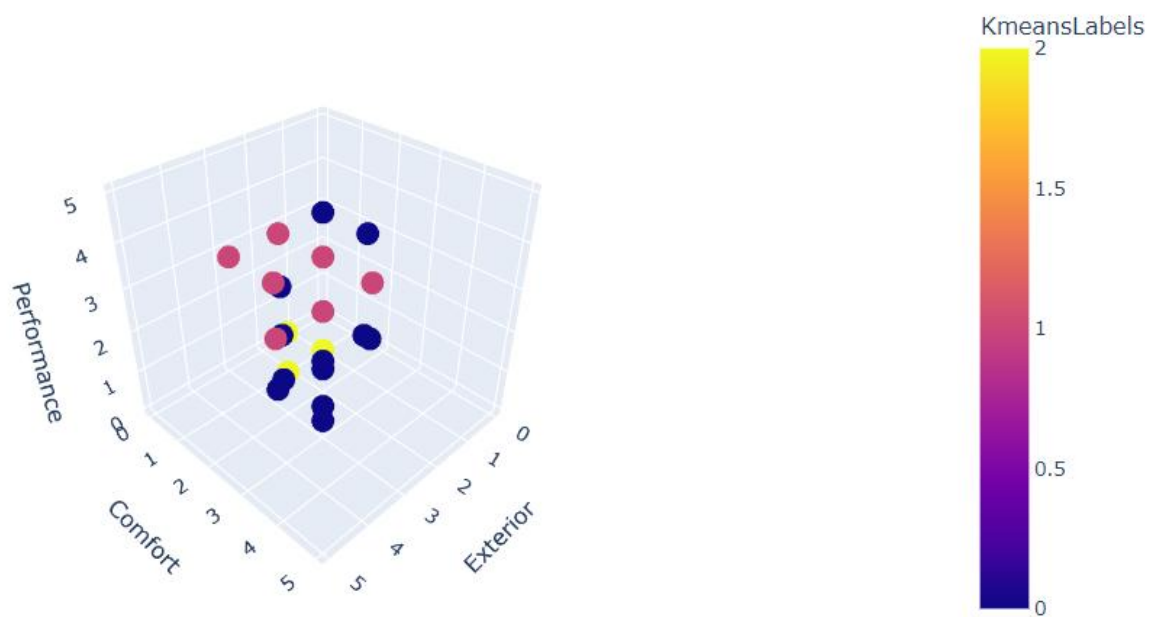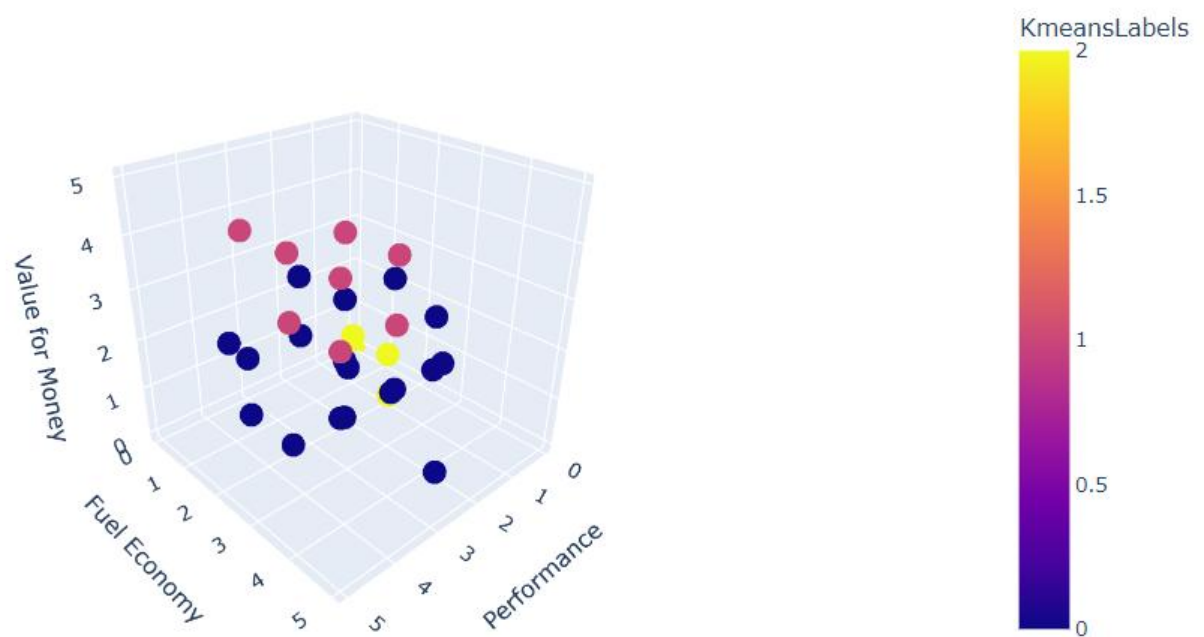
Conclusion:

The analysis of user reviews in the Indian Electric Vehicle (EV) market has uncovered critical insights into the preferences of potential buyers who have not yet made an EV purchase. This distinct segment exhibits consistent behavioral, demographic, and psychographic patterns, which can be instrumental in shaping targeted marketing strategies:

Behavioral Analysis:

1. Preference for Exterior and Comfort:
  - Notably, individuals who have yet to transition to EVs consistently rate the exterior design and comfort levels of these vehicles more favorably than other features. This behavioral trend underscores the significance of aesthetics and ergonomic considerations in their purchasing decisions.

2. Potential for Conversion:
  - Recognizing that this segment is already showing interest in specific aspects of EVs, there is a strong potential for conversion. By addressing their preferences, manufacturers and marketers can effectively influence their decision-making process.

Demographic Analysis:

1. Income Segmentation:
  - Given that this segment encompasses individuals who have not yet adopted EVs, it likely represents a diverse range of income groups. Therefore, targeting both middle-income and high-income brackets should be a priority.

2. Urban vs. Rural Considerations:
  - Considering the higher preference for exterior design, it's probable that urban dwellers form a substantial portion of this segment. However, marketing strategies should also consider rural areas, especially if comfort and functionality can be emphasized.

Psychographic Analysis:

1. Environmental Consciousness:
  - There's a potential for this segment to be environmentally conscious, which aligns with the broader sustainability narrative of EVs. Marketing efforts can highlight the positive environmental impact of adopting EV technology.

2. Innovation and Technology Enthusiasts:
   - This segment is likely to be technology-savvy and open to innovation. Messages that emphasize the cutting-edge technology and features of EVs can resonate strongly with them.

3. Status and Image-Driven Consumers:
   - Image and status are influential factors in their decision-making process. Positioning EVs as stylish, modern, and progressive options can strongly appeal to this group.

4. Comfort-Seeking Lifestyle:
   - Comfort is a significant driver for this segment. Tailoring marketing messages to emphasize the comfort and convenience offered by EVs can be highly effective.

In conclusion, this targeted segment of potential EV buyers is characterized by a preference for exterior design and comfort, potentially driven by a combination of income level, urban residence, environmental consciousness, technological interest, and a desire for a stylish and comfortable driving experience. By crafting marketing strategies that address these specific preferences and characteristics, manufacturers and marketers have a substantial opportunity to capture the attention and interest of this segment, potentially leading to increased adoption of electric vehicles in India.

Dataset 2
(by Irfan Wahid)

Charging Stations on Highways:

|	Sl. No.	Highways/Expressways	Charging Stations
0	1	Mumbai - Pune Expressway	10
1	2	Surat-Mumbai Expressway	30
2	3	Mumbai - Delhi Highway	124
3	4	Mumbai - Panaji Highway	60
4	5	Mumbai - Nagpur Highway	70
5	6	Mumbai - Bengaluru Highway	100
6	7	Agra-Nagpur	80
7	8	Kolkata- Nagpur	120
8	9	Chennai- Nagpur	114
9	Total	Total	708

Number of Charging Stations on Highways
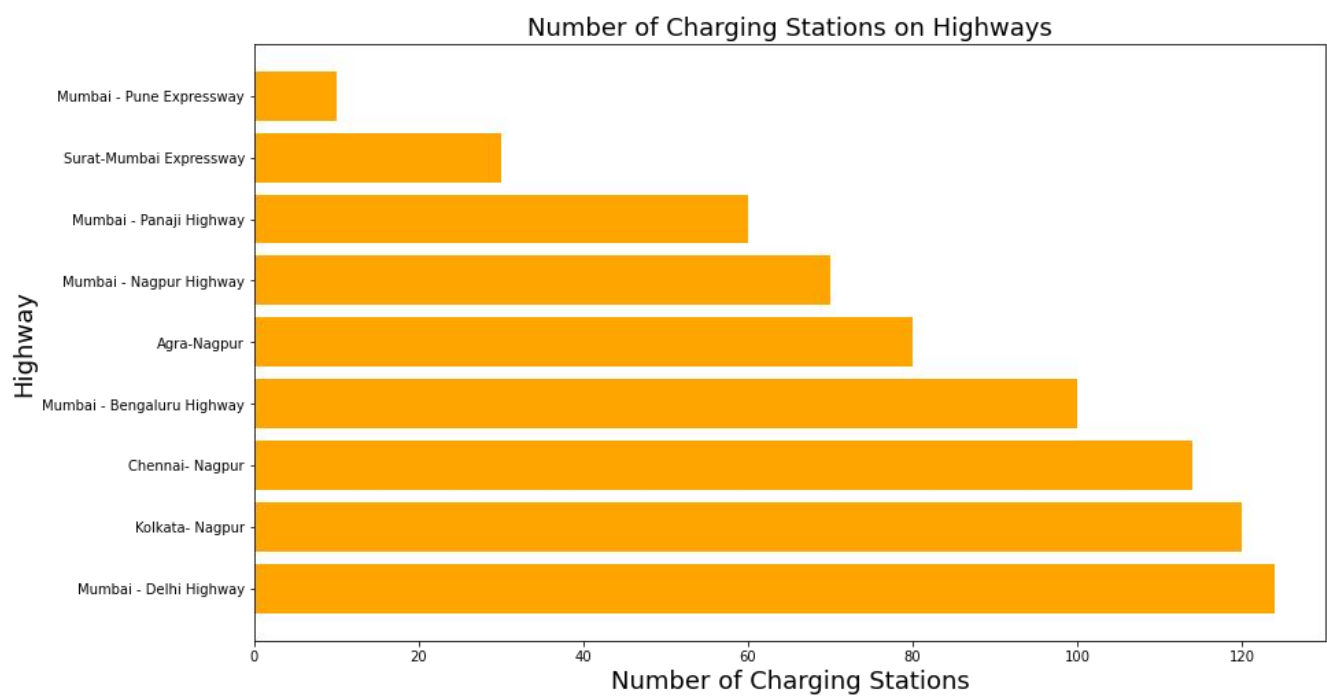
Sanctioned Charging Stations:

	State/UT-wise	Number of Electric Vehicle Charging Sanctioned
0	Maharashtra	317
1	Andhra Pradesh	266
2	Tamil Nadu	256
3	Gujarat	228
4	Uttar Pradesh	207
5	Rajasthan	205
6	Karnataka	172
7	Madhya Pradesh	159
8	West Bengal	141
9	Telangana	138
10	Kerala	131

Number of Electric Vehicle Charging Sanctioned for each state
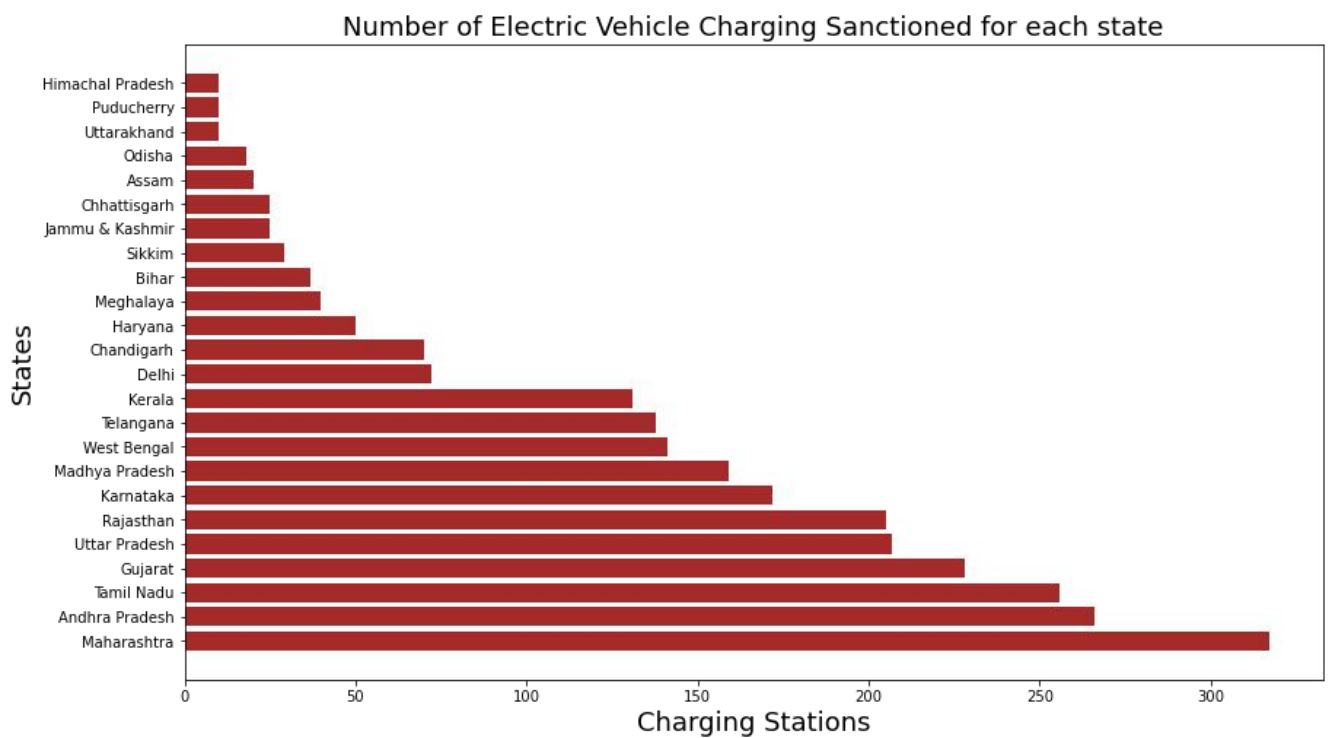
Average Number of Electric Vehicles across all states:
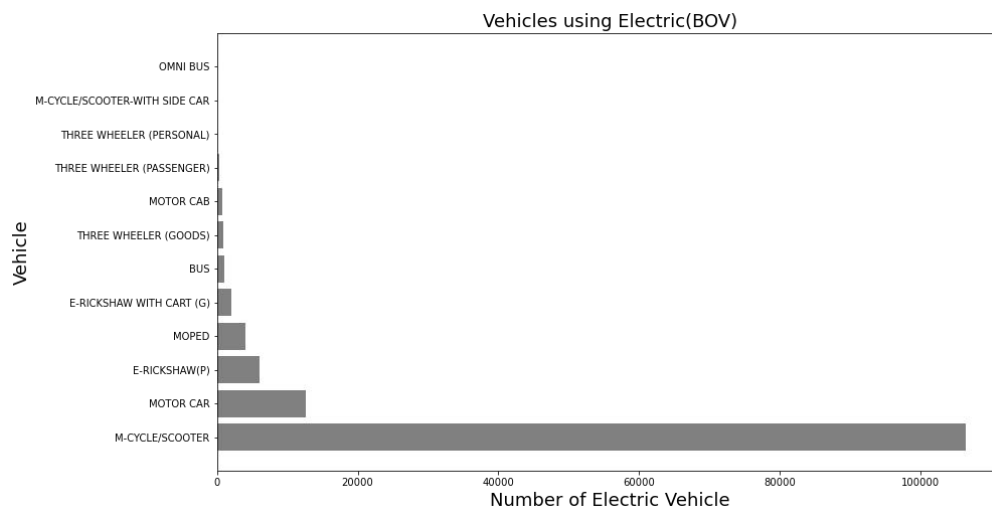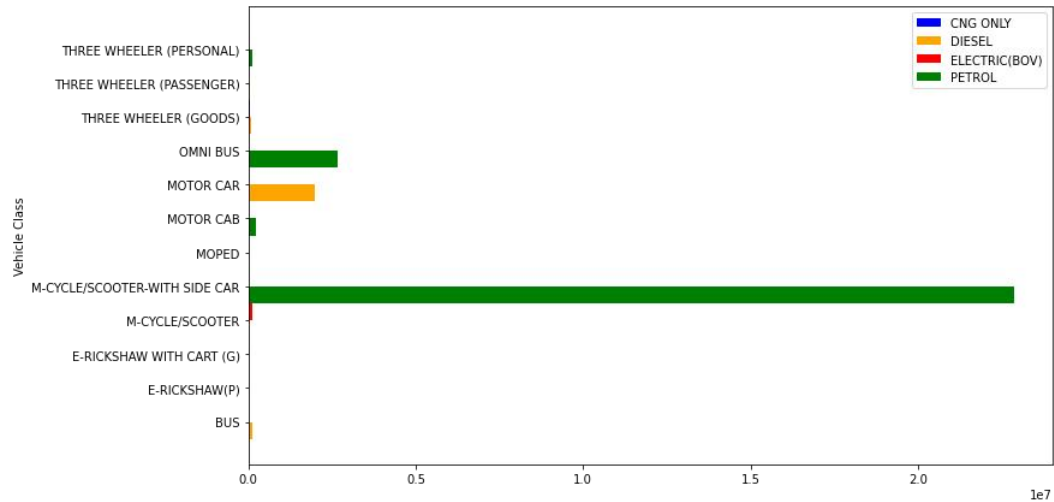

Mean of Electric Vehicles
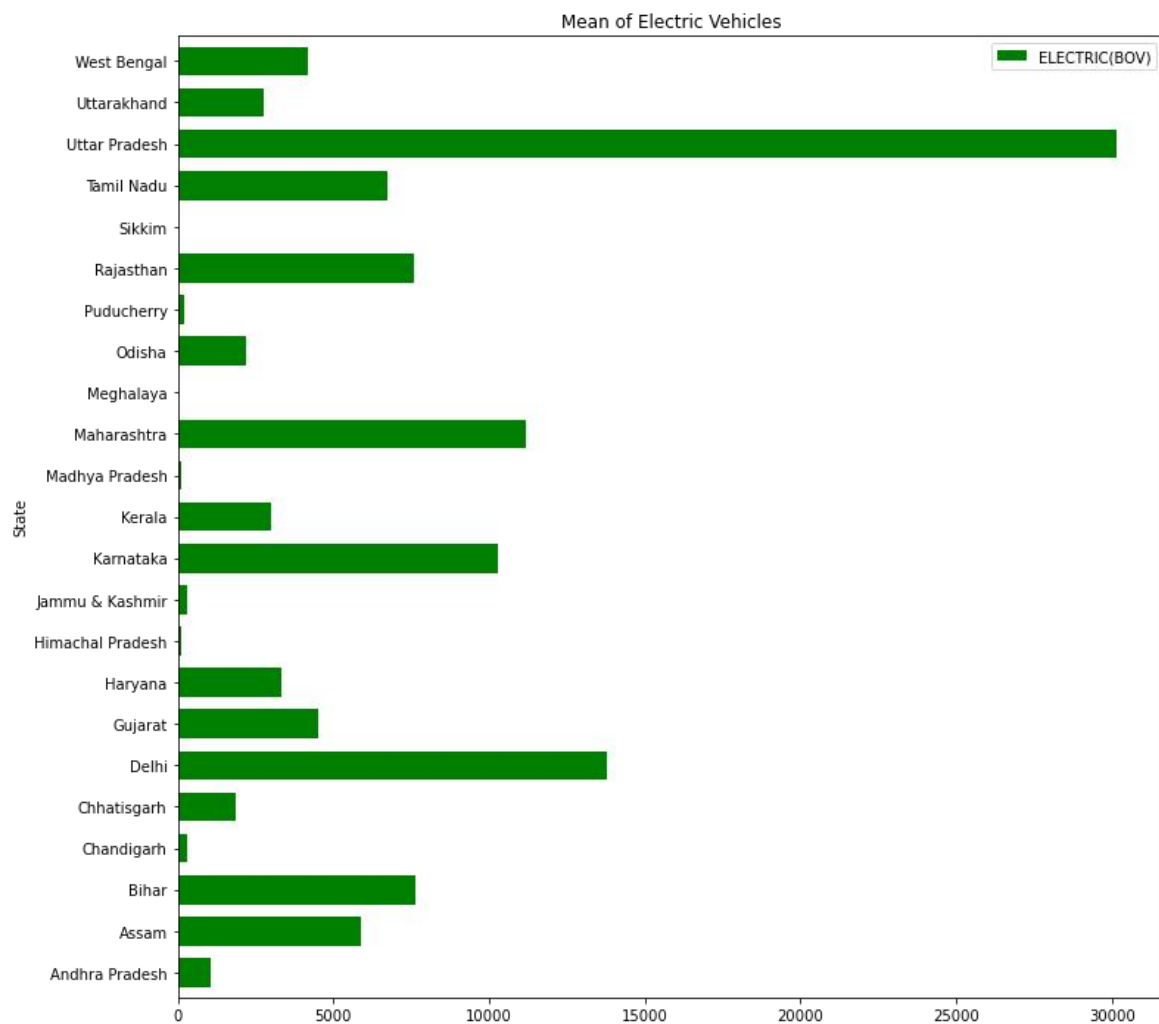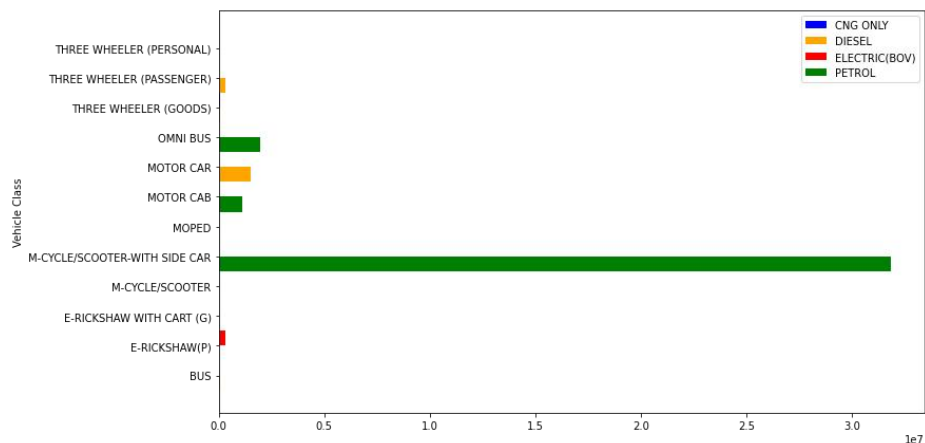
States to target :

- Maharashtra
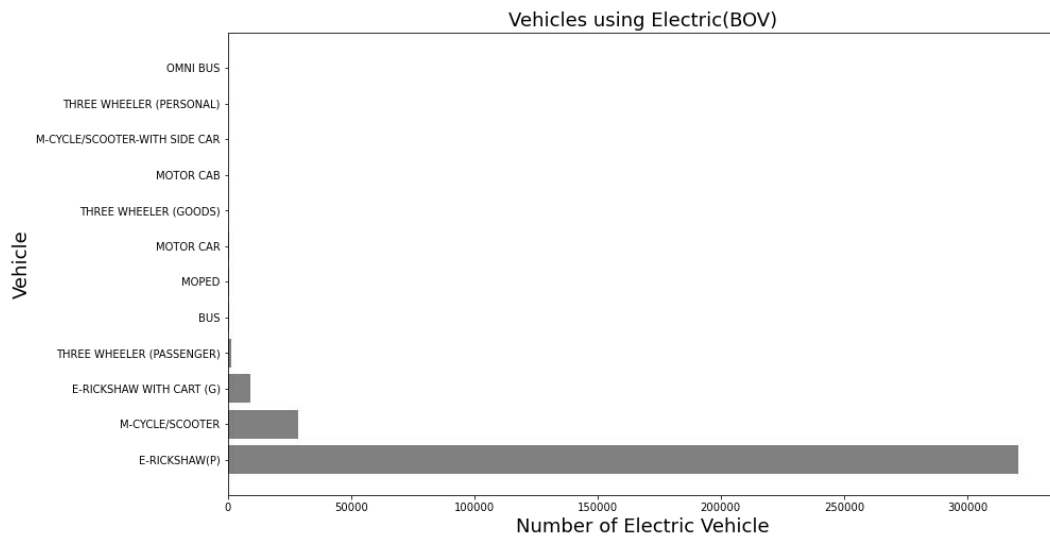- Uttar Pradesh
- Karnataka
- Gujarat
- Delhi
- Rajasthan
- Haryana

Visualizing the type of fuel used for every vehicle class and which vehicle space uses Battery operated Fuel (EV):
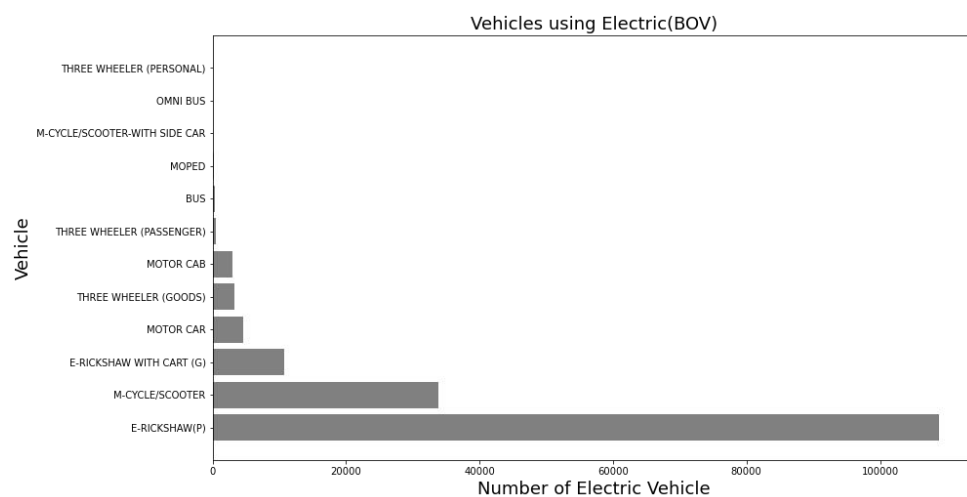
Maharashtra -

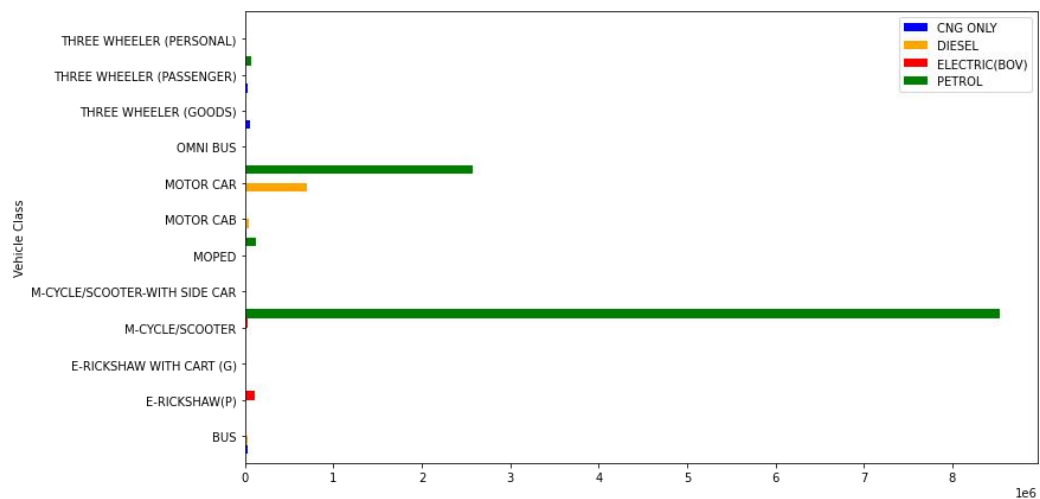

Vehicles using Electric(BOV)

Uttar Pradesh -

Vehicles using Electric(BOV)

Delhi -

Vehicles using Electric(BOV)

Karnataka -

Rajasthan -
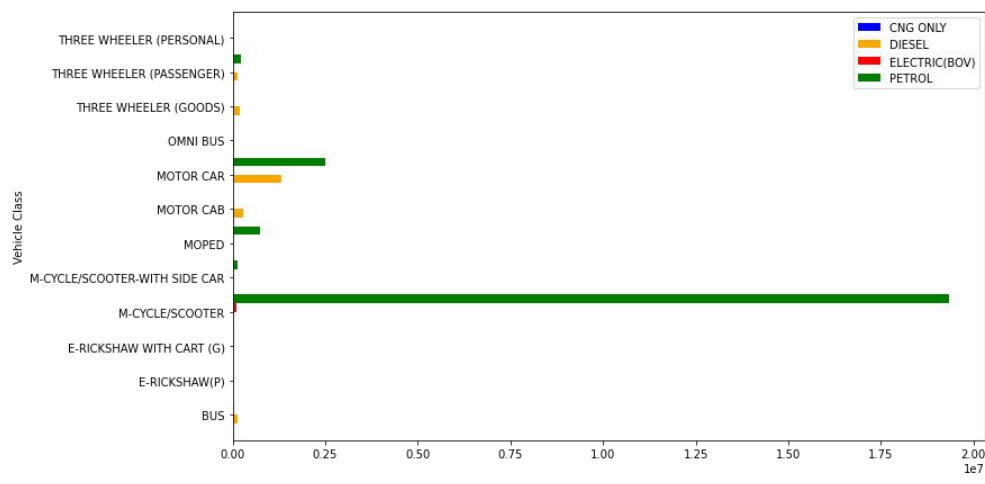
Vehicles using Electric(BOV)

Guajrat -

Vehicles using Electric(BOV)
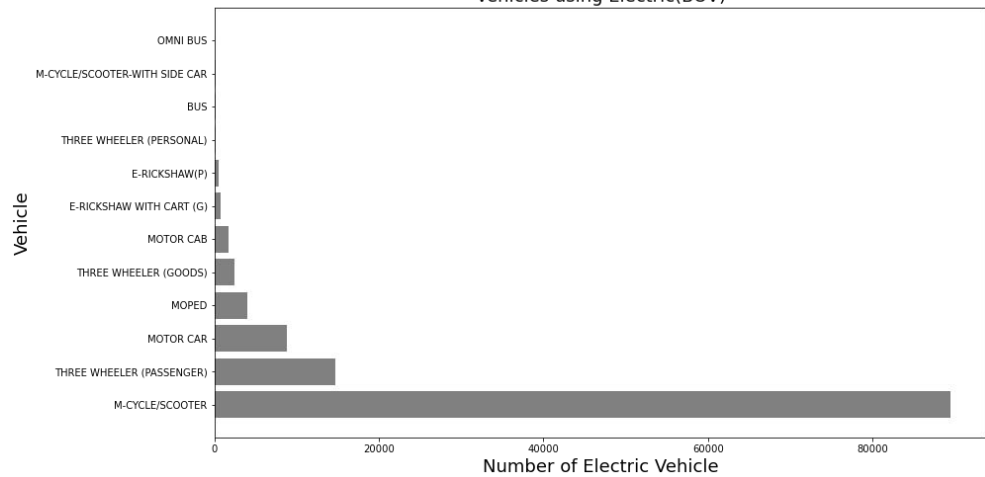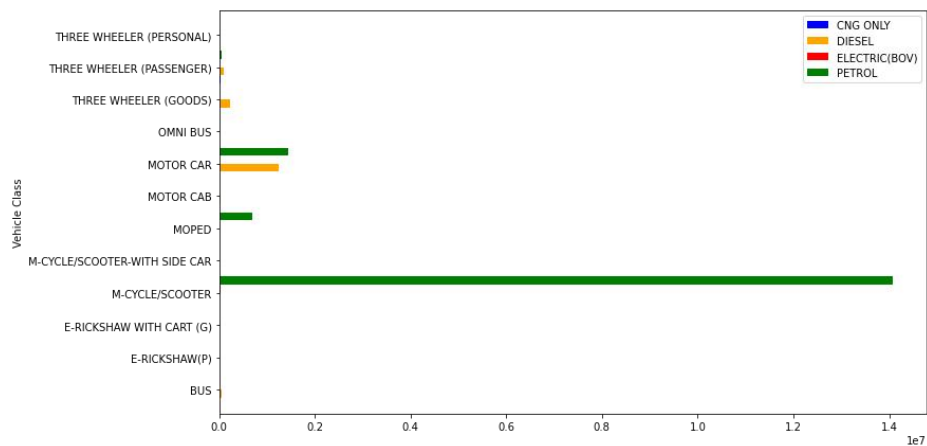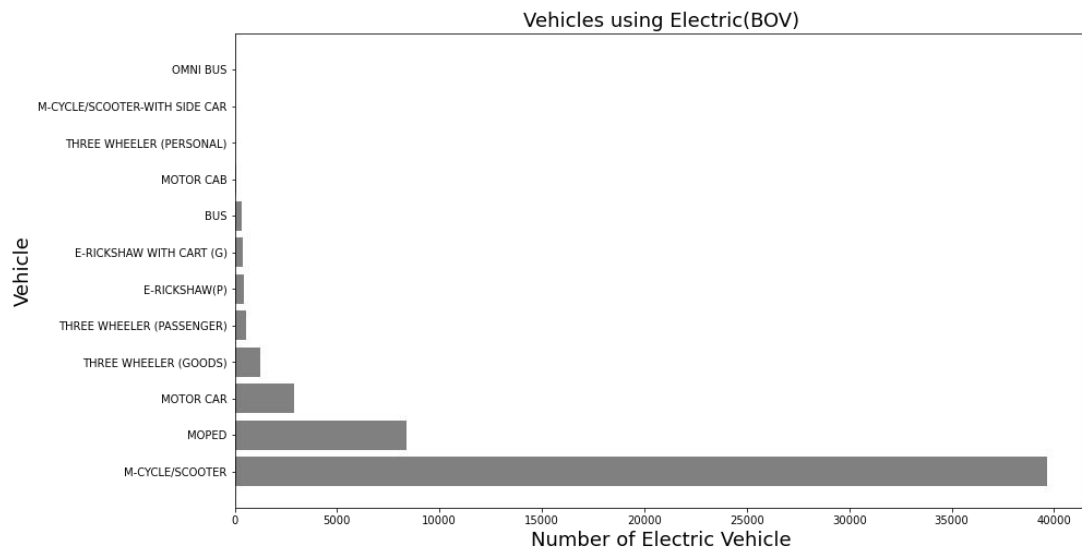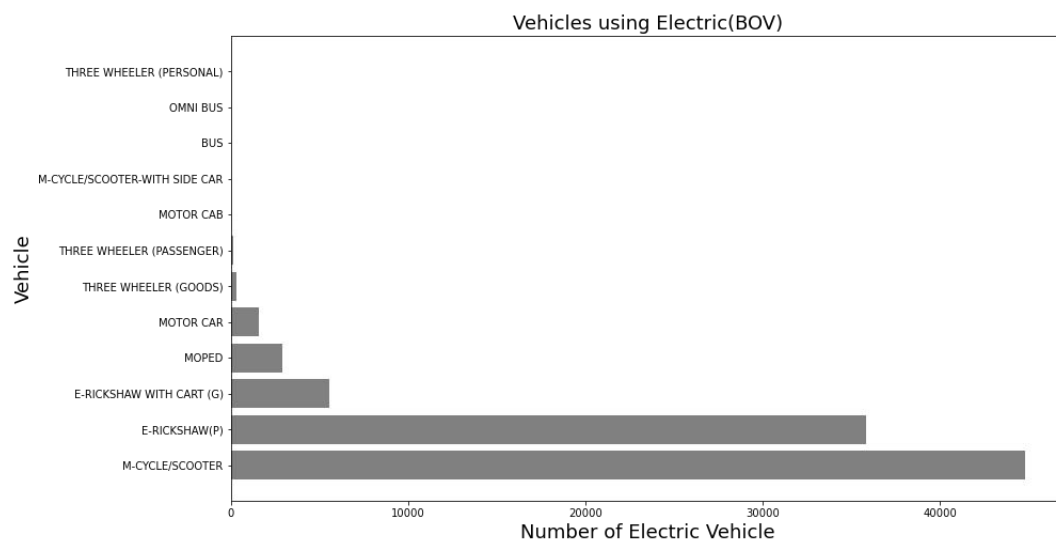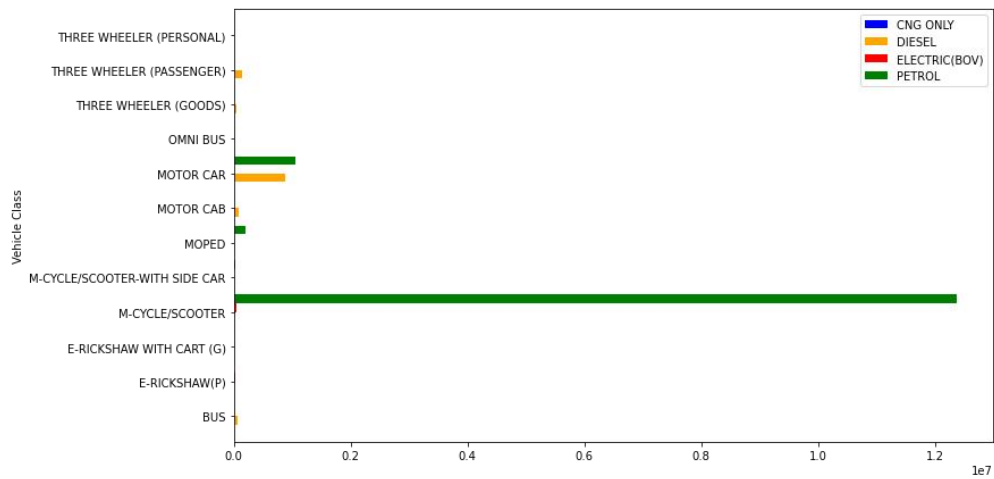
Haryana -

Number of EVs in India:

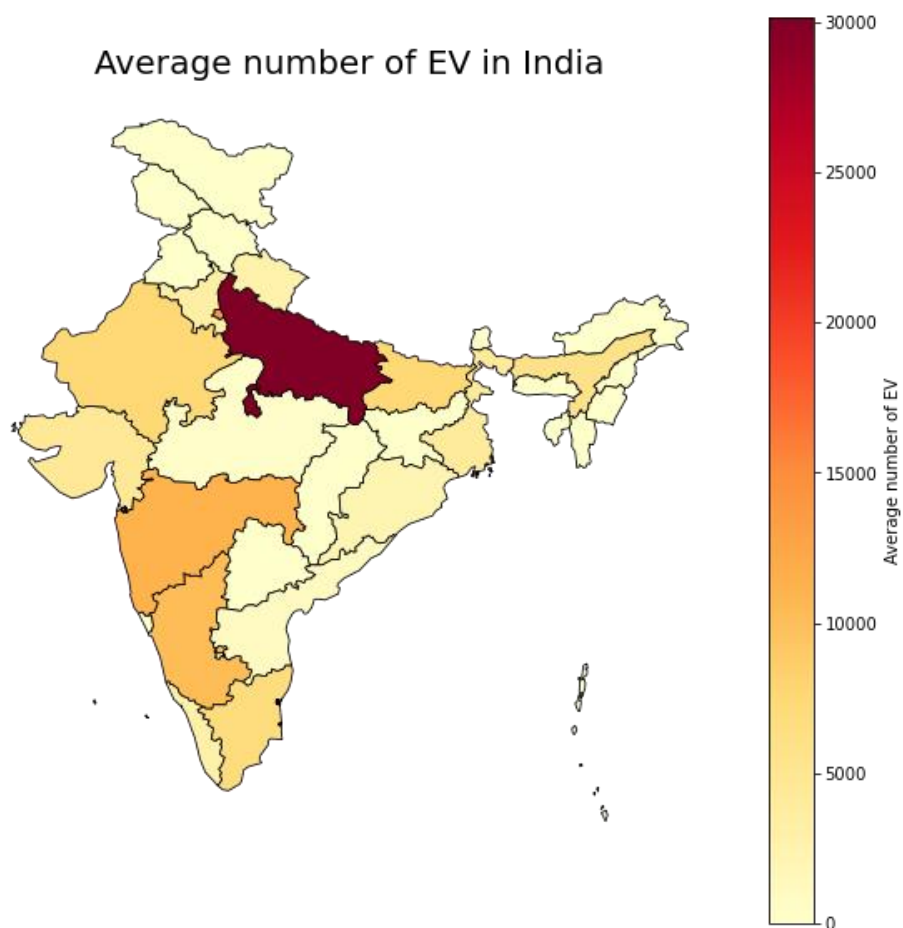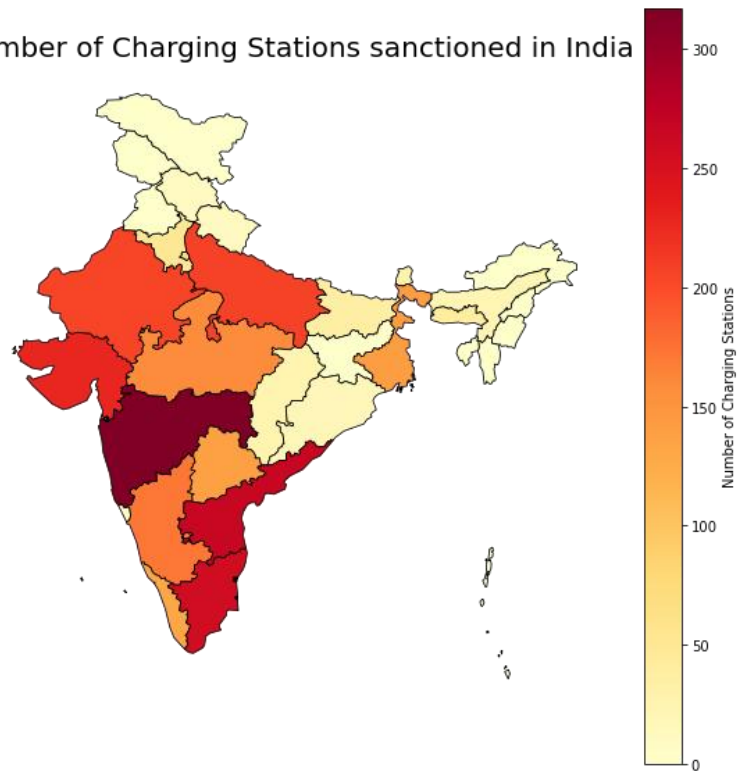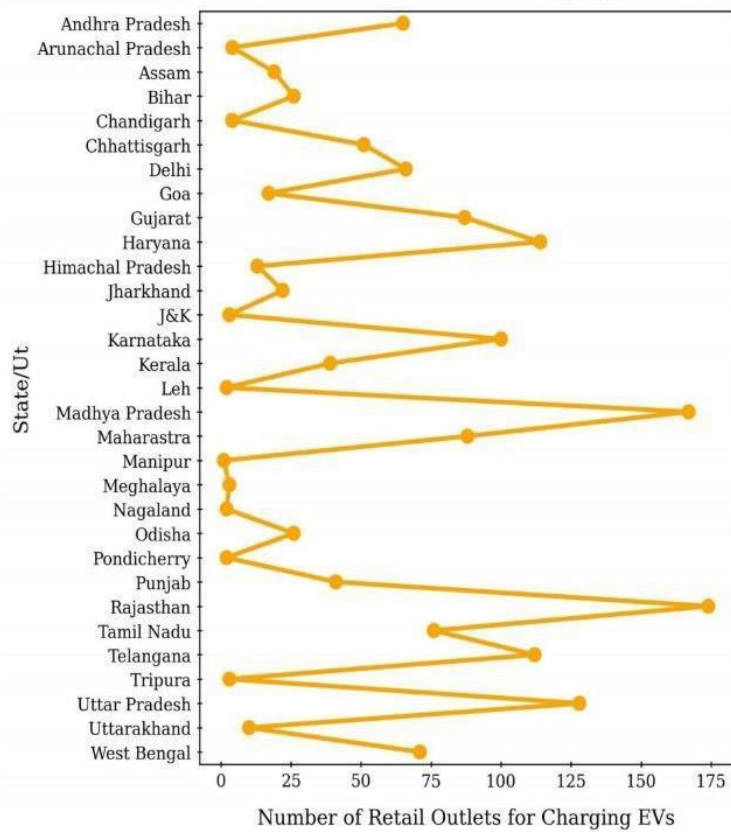Average number of EV in India
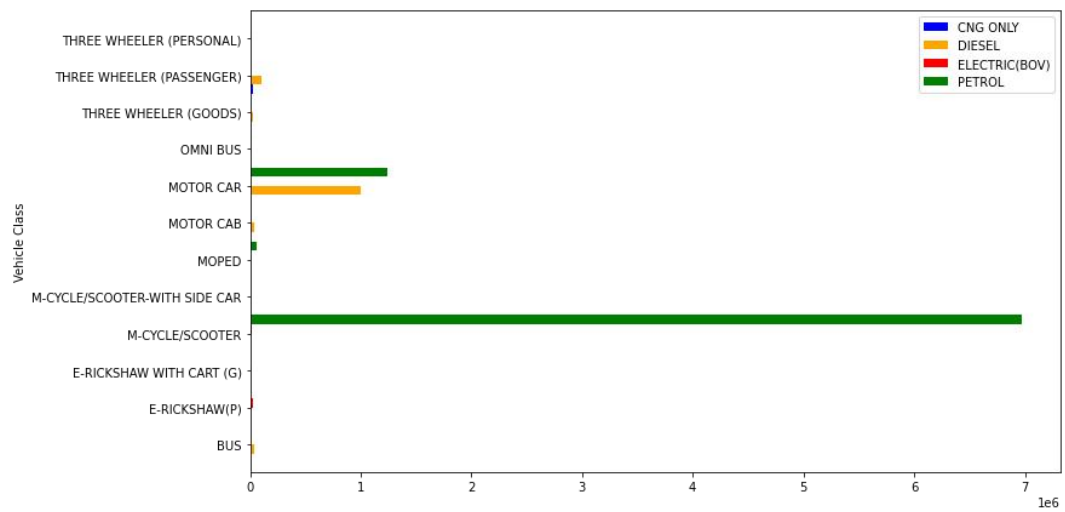
Charging Stations Sanctioned:

Number of Charging Stations sanctioned in India

Available Retail Outlets for Charging EVs in India

Charging stations can be a part of both demographic segmentation and geographical segmentation in market segmentation, depending on the context and purpose of the segmentation.

Demographic Segmentation:

This involves categorizing consumers based on demographic factors such as age, gender, income, education, and lifestyle. Charging station providers might use demographic segmentation to identify target customer groups who are more likely to use electric vehicles and, therefore, require charging services.

Geographical Segmentation:

Geographical segmentation focuses on dividing the market based on geographic factors such as location, region, city size, and climate. In the case of charging stations, this segmentation is often crucial because the availability and placement of charging stations need to align with the geographic distribution of electric vehicle users.

Conclusion:

The analysis of electric vehicle charging station and chargers data presented in this report underscores the growing importance of EV infrastructure in our sustainable future. The insights gained from this analysis not only reveal the increasing adoption of electric vehicles but also highlight the need for strategic expansion of charging networks to meet this demand. As the world transitions towards cleaner transportation, this data serves as a valuable resource for policymakers, businesses, and individuals looking to make informed decisions in support of a greener and more energy-efficient future.

Dataset 3
(by Atif Shaik)

|	Age	City	Gender	Education Level	Occupation	Family Members	Annual Income	Charging Hours	Electric Cars are economical	Charging stations	Convert your car to all electric	Hybrid or Both	Next car will be electric car?
0	29	Kolkata	Male	Postgraduate	Working Professional	5	150000	1	Yes	15	Yes	Hybrid car	5
1	29	Mumbai	Male	Graduate	Working Professional	4	1000000	1	Yes	8	Yes	Electric car	5
2	25	Mumbai	Male	Graduate	Working Professional	4	5000	5	Yes	15	Didn't think about it	Hybrid car	5
3	25	Bangalore	Male	Graduate	Working Professional	4	750000	1	Don't know	8	Didn't think about it	Hybrid car	5
4	21	Mumbai	Male	Postgraduate	Student	4	5000	12	Don't know	15	Didn't think about it	Hybrid car	5

EDA:
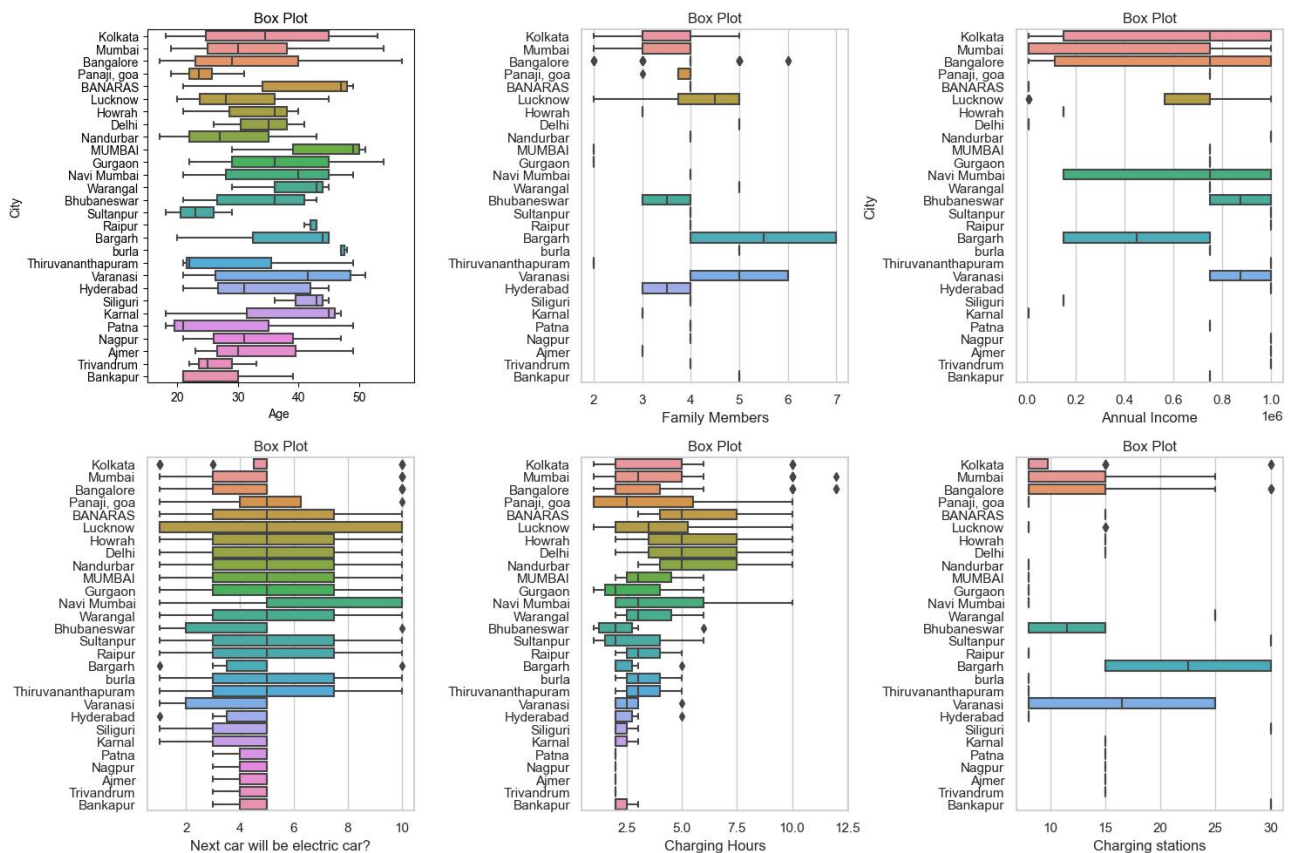
Bangalore has the most charging station implies usage/sales of EV is highest in Bangalore

As we see people from different income ranges have similar buying preferences on EV, Implies Person's Annual Income is not a major factor contributing towards sales of EV
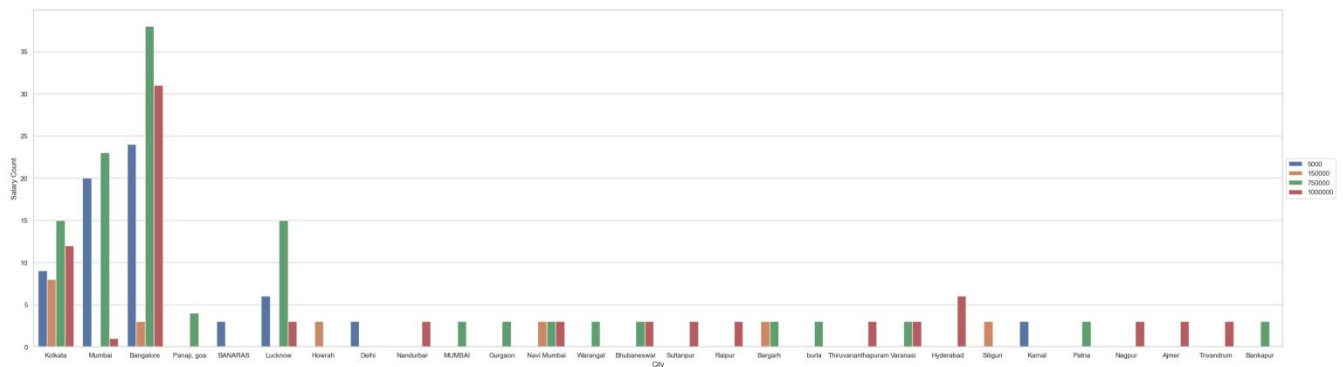
In Most to the top EV buying cities people with income range of 7-8 lakhs buys the most EV vehicles.

People with Income range 1-2 lakhs per annum is the least interested familied towards EV.

In Mumbai people's income > 10 lakhs also contributes least towards EV sales.

Shockingly based on dataset people's income < 5000 also buys EV (Down payment mostly) which is understandable to avoid petrol cost.

Apparently Youngers are more into EV - Vehicles Aged [25-33], people after 35 have no preference for buying an EV

As in the above inference youngsters doing an Undergraduate degree mostly buys EV - Vehicles
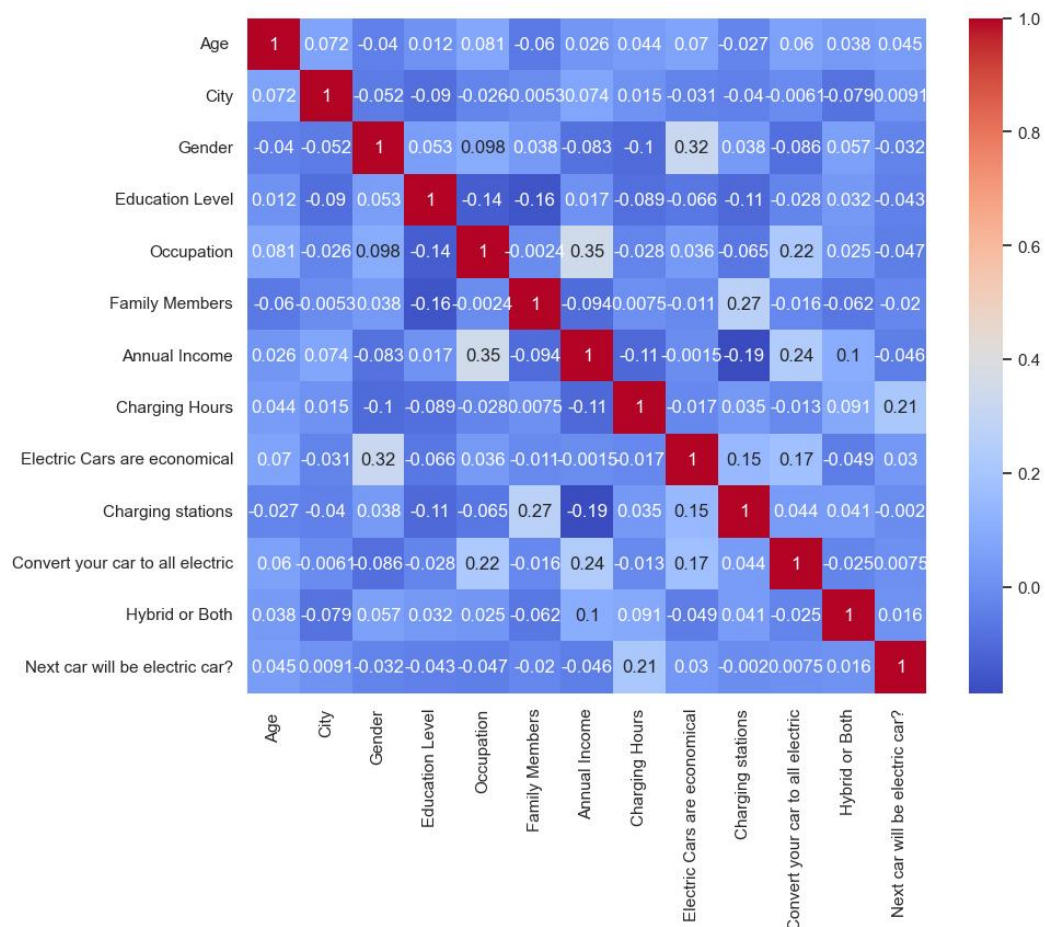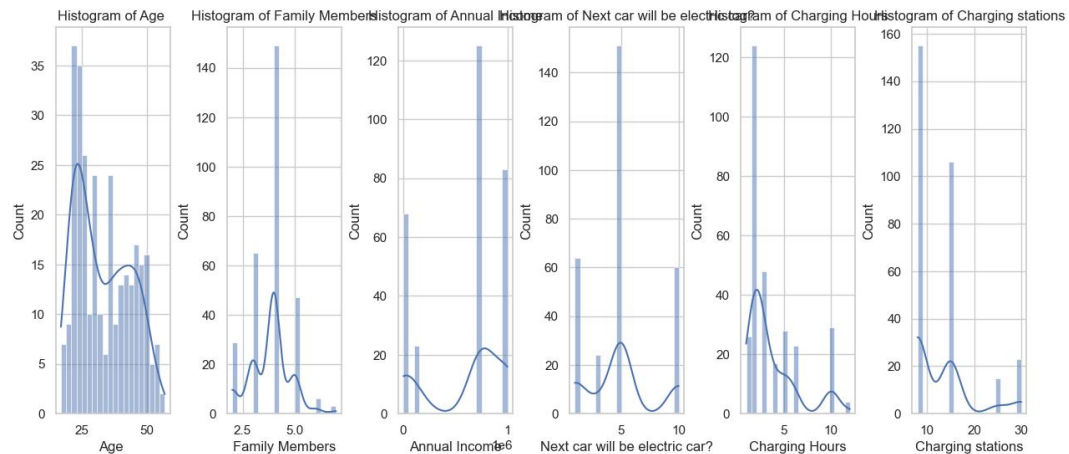
As we can see from the above inference variables are slightly corrrelated to each other. Highest linear positive relation is between Gender and Opinion on Electrical cars are economical.

Highest Negative relation is between charging station and Education Level (Implies Educated individual inclines more towards EV-Vehicles).
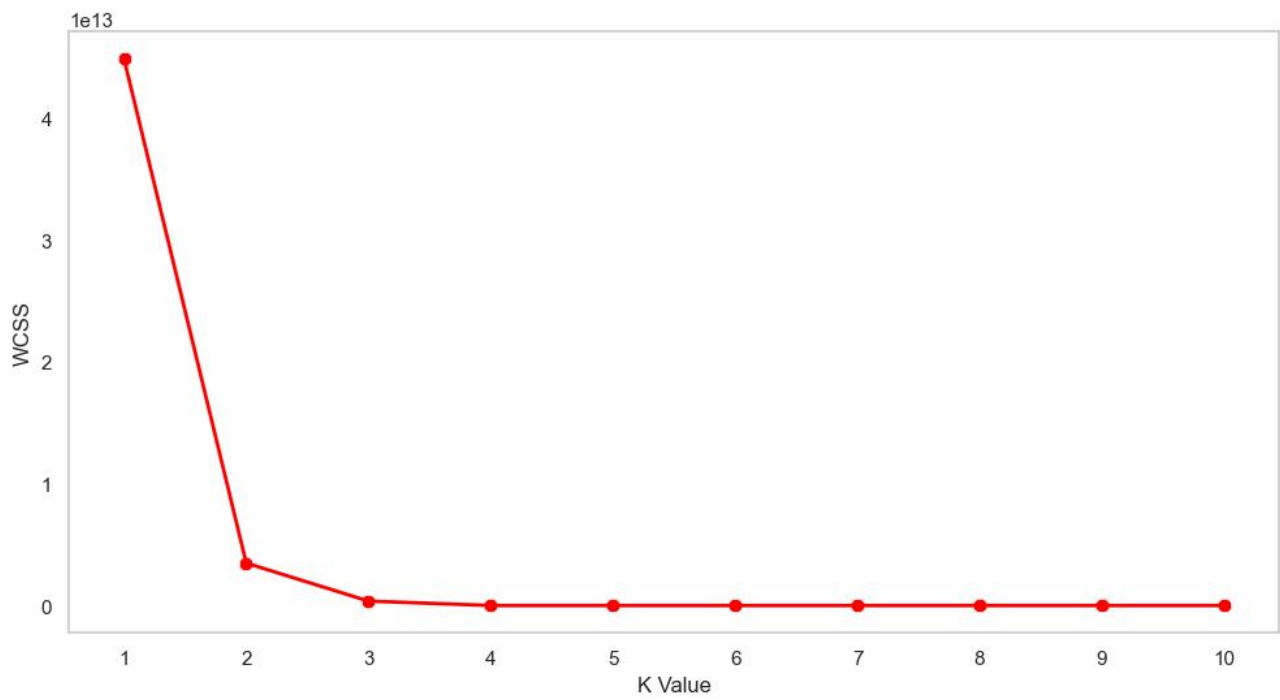
Therefore the number of clusters = 4
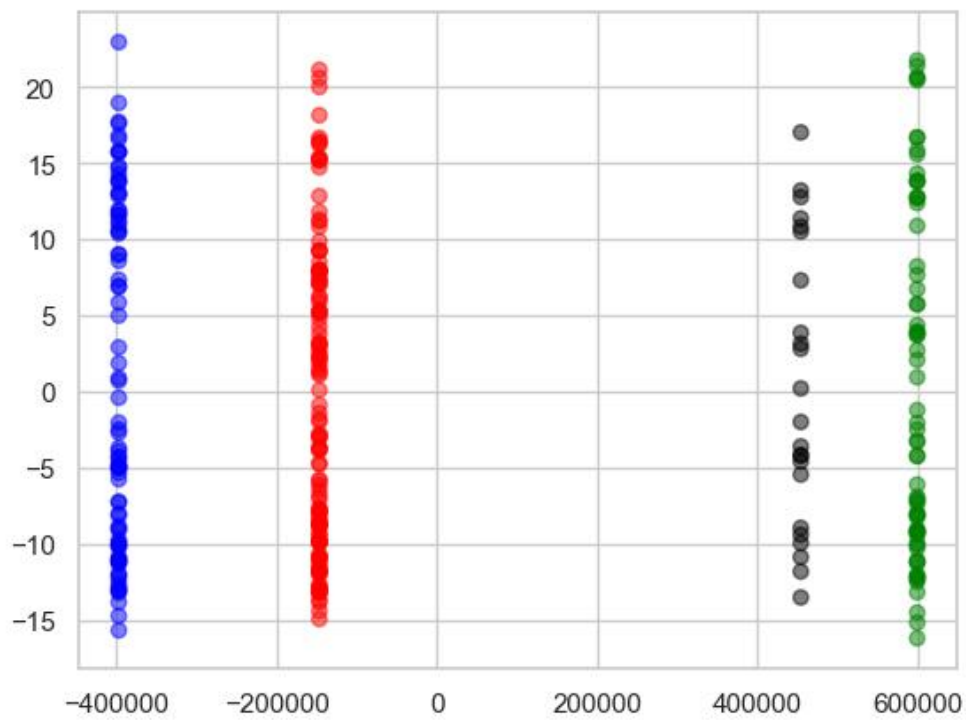
Conclusion:

- The most optimal places to setup an EV-startup are: Bangalore, Kolkata, Mumbai.
- Usually Graduates are more interested into EV and Post Graduates and High Schoolers are least interested.
- People with income 7-8 lakhs per annum (Middle Class) are most likely to get an EV.
- People with income < 2 lakhs are least buyers of EV.
- People with income > 10 lakhs are decent buyers with an influence of other factors on their buying.
- Family members with the size of 4 are more likely to buy EV followed by 3 and 5.

DataSet 4
(by Aniket Mankar)

```
In [4]: df.head(10)
Out[4]:
```

	Brand	Model	AccelSec	TopSpeed_KmH	Range_Km	Efficiency_WhKm	FastCharge_KmH	RapidCharge	PowerTrain	PlugType	BodyStyle	Segment
0	Tesla	Model 3 Long Range Dual Motor	4.6	233	450	161	940	Yes	AWD	Type 2 CCS	Sedan	D
1	Volkswagen	ID.3 Pure	10.0	160	270	167	250	Yes	RWD	Type 2 CCS	Hatchback	C
2	Polestar	2	4.7	210	400	181	620	Yes	AWD	Type 2 CCS	Liftback	D
3	BMW	iX3	6.8	180	360	206	560	Yes	RWD	Type 2 CCS	SUV	D
4	Honda	e	9.5	145	170	168	190	Yes	RWD	Type 2 CCS	Hatchback	B
5	Lucid	Air	2.8	250	610	180	620	Yes	AWD	Type 2 CCS	Sedan	F
6	Volkswagen	e-Golf	9.6	150	190	168	220	Yes	FWD	Type 2 CCS	Hatchback	C
7	Peugeot	e-208	8.1	150	275	164	420	Yes	FWD	Type 2 CCS	Hatchback	B
8	Tesla	Model 3 Standard Range Plus	5.6	225	310	153	650	Yes	RWD	Type 2 CCS	Sedan	D
9	Audi	Q4 e-tron	6.3	180	400	193	540	Yes	AWD	Type 2 CCS	SUV	D

EDA on Vehicle data:
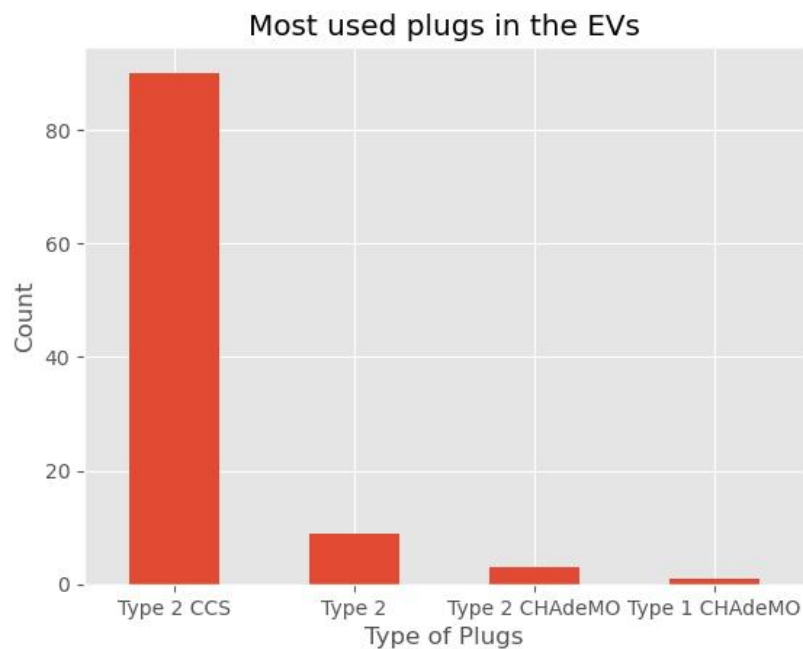
Most Electric Vehicle use **Type 2 CCS** of Plugs to charge.
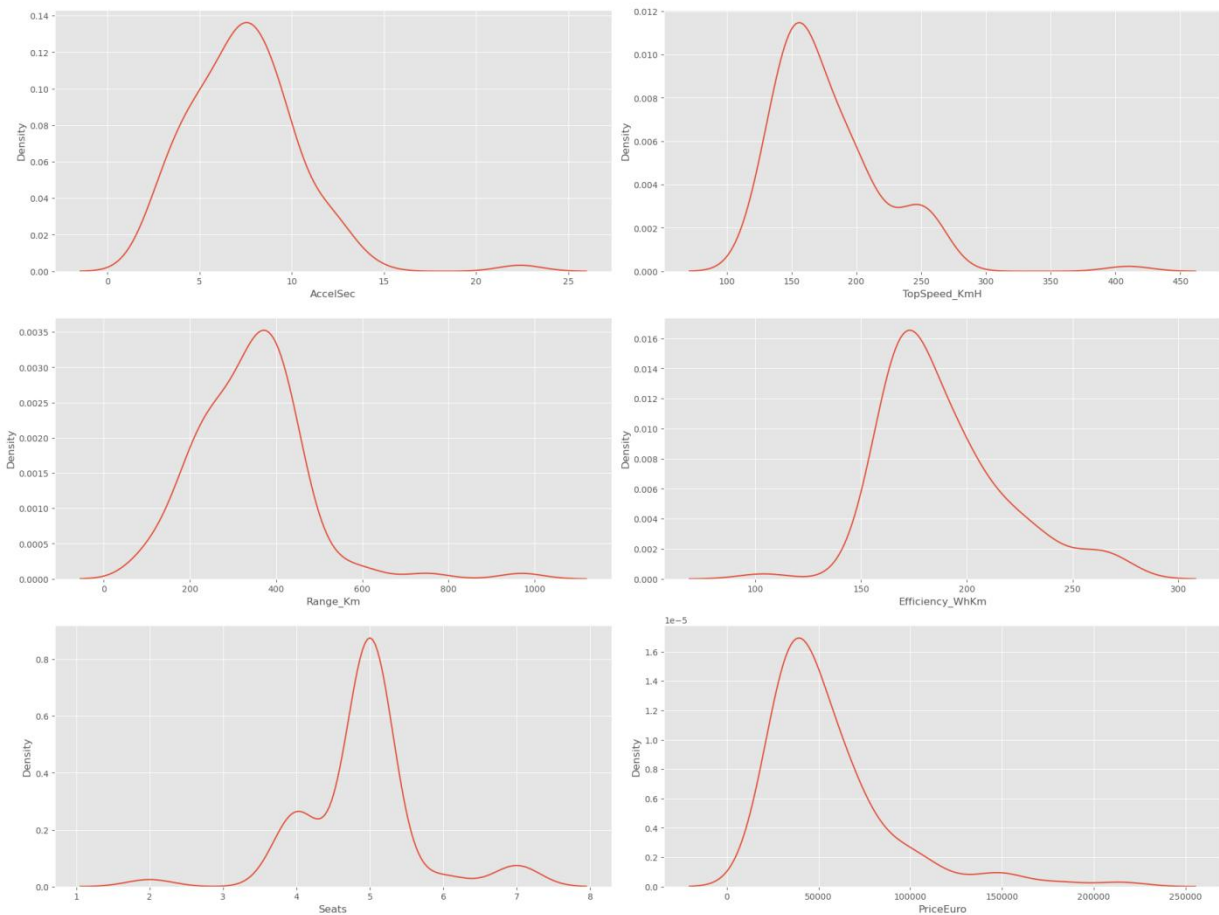
Here we see a clear picture of how our data is distributed. Majority of Cars in our dataset are 4-5 seaters. The average range of cars is around 350km. The graph for the Acceleration per second is broad. Most cars have top speed around 160 km/hr with few being super-fast cars with 250km/hr speed. The average price is around 40,000 Euros.
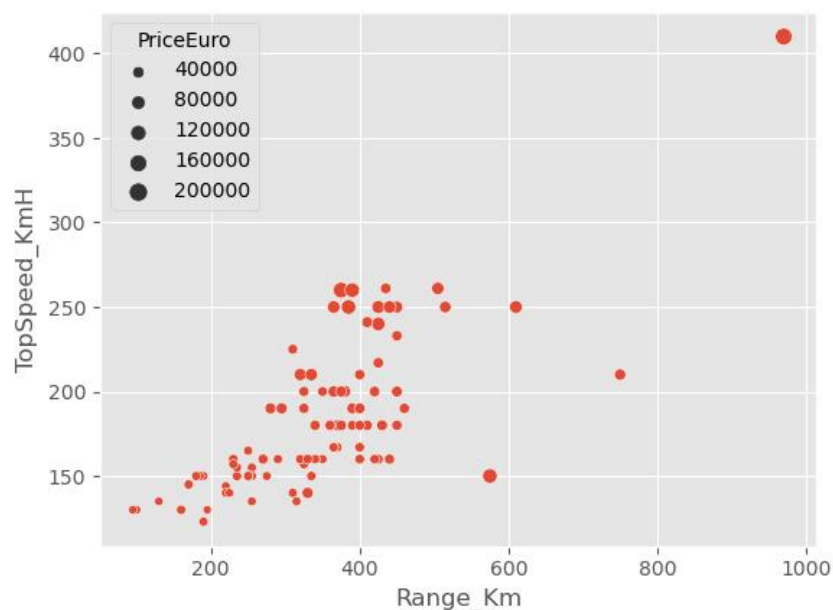
The above graph shows that there's a clear correlation between the Range and the Top Speed of the Vehicle. This is surprising to see as we would have thought the fast the car is the lower the Range it will have.

Following is the pair plot it shows various columns correlation with each other.
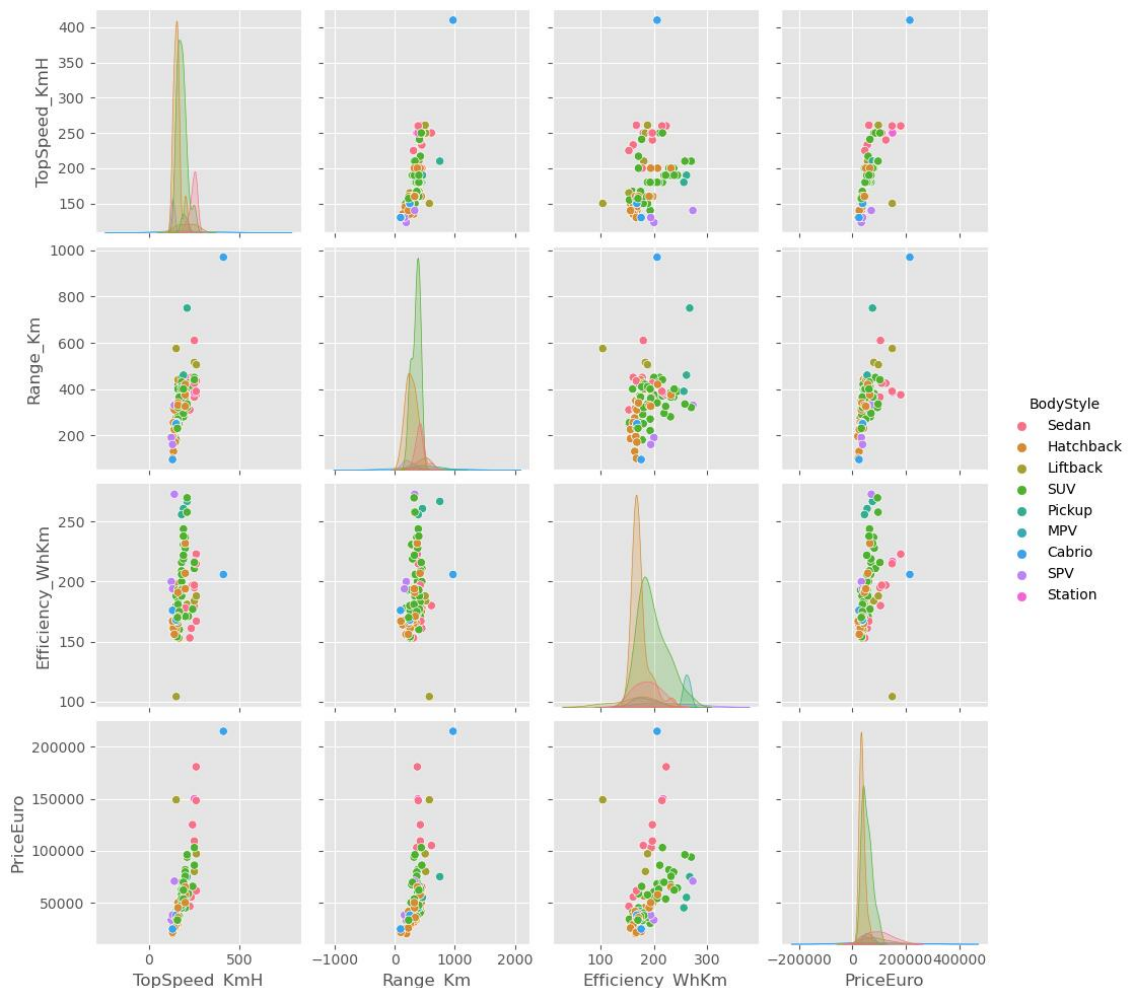
Count of different Brands of Vehicles:
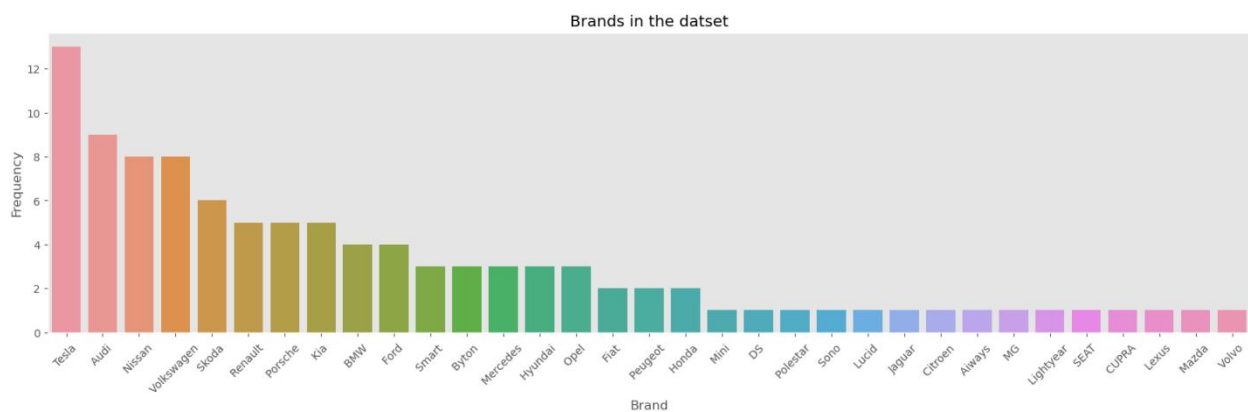
Average range of the Car Brands:

Brand VS. Range of the Cars (Sorted by Range_Km)
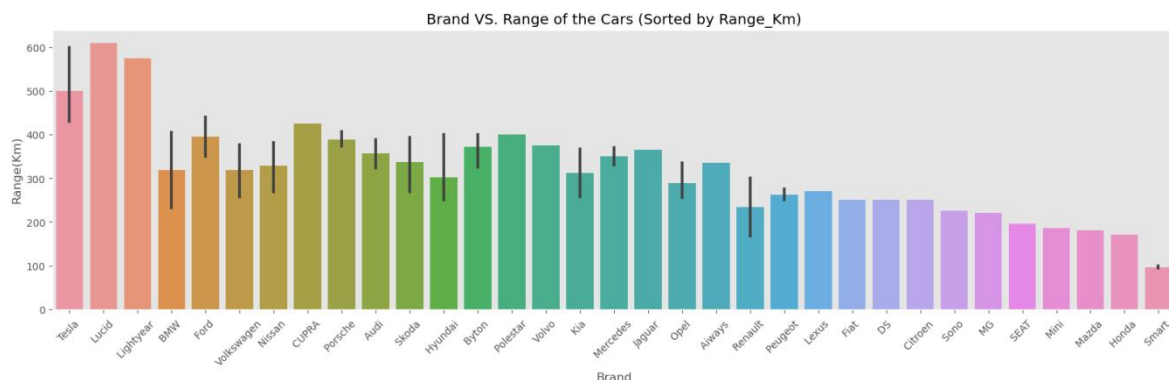
Average top Speed of the Vehicles:

Brand VS. Top Speed of the Cars (Sorted by Top Speed(Km/Hr))
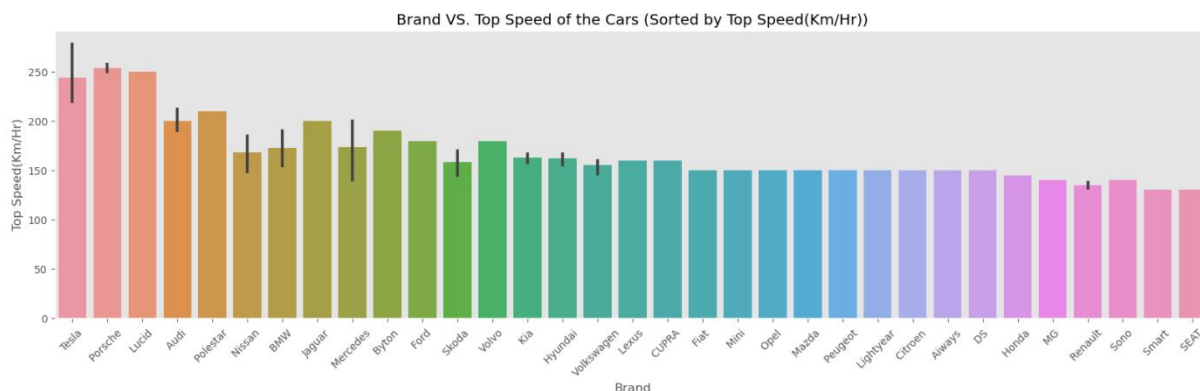
We see that Tesla, Porsche, Audi, Nissan, Volkswagen, and Skoda are few companies that have most cars with high average top speed and range.

Now, we will check correlation between different features of our data set:
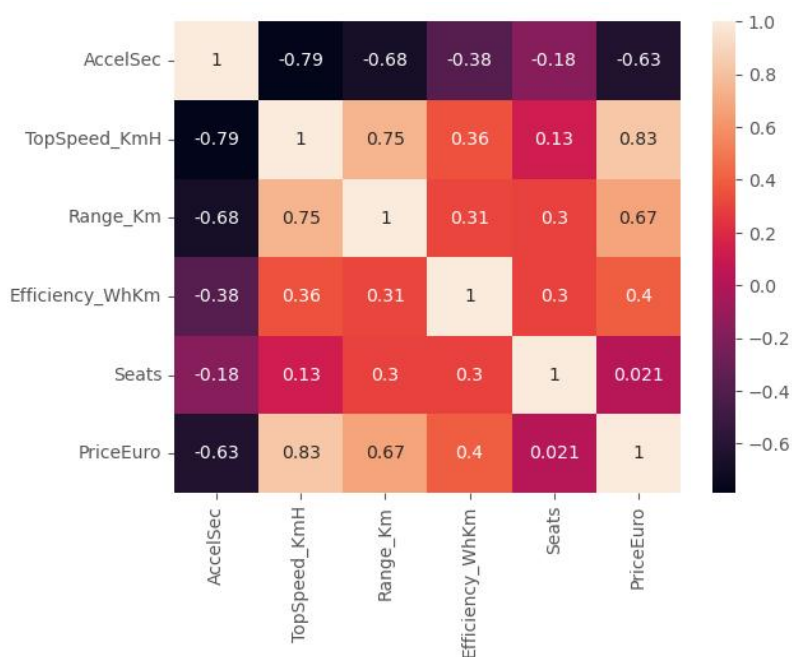
Strong Positive correlation:
Range and Top Speed of the Vehicle
Price and Top Speed of the Vehicle
Range and Price of the Vehicle

Strong Negative Correlation:
Acceleration and Top Speed of the Vehicle
Range and Acceleration of the Vehicle
Price and Acceleration of the Vehicle

These suggests that there are two distinctive groups which is high in price, has more Acceleration like Super-fast Sport Cars and other with good Top Speed and lower price.

To do the cluster Analysis we will next convert our attributes into the Categorical format to form well defined clusters.

We will first do cluster analysis between Top Speed of the Vehicles and the Price of the Vehicle. We first subset the categorized data set into features we want to explore and then find the optimum number of clusters using first Elbow Method and then Dendrogram method:
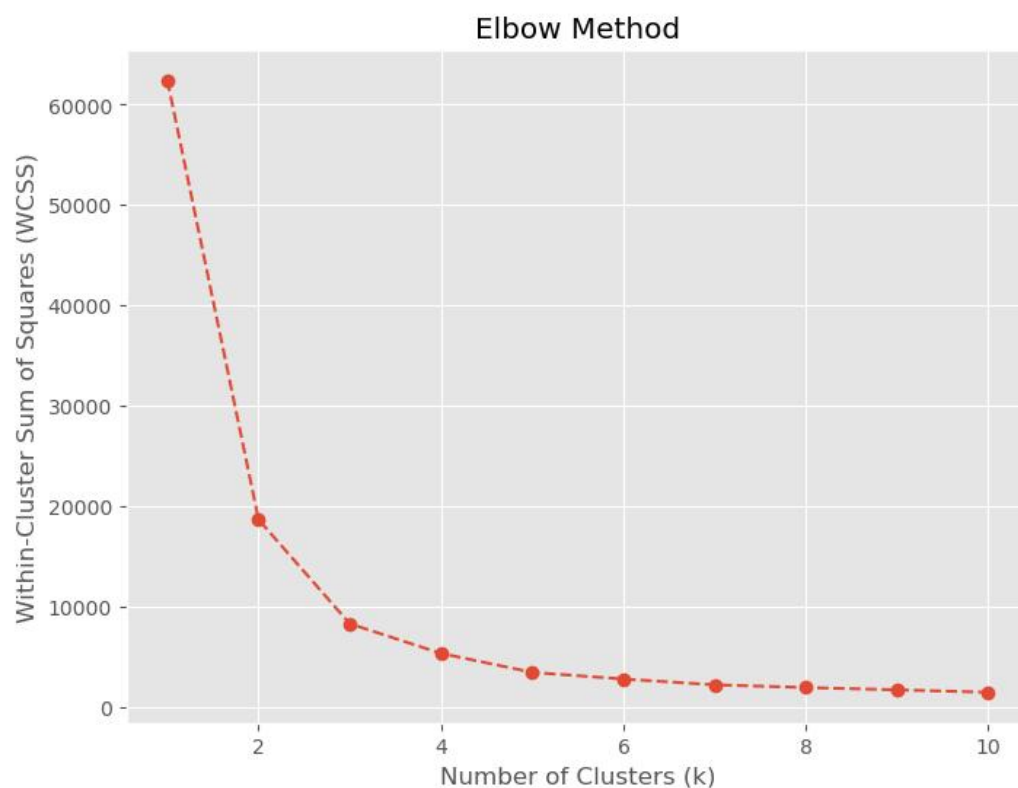
We plotted these with 3 clusters, but we saw that we can get better result by solving for 5 clusters which we found out using dendrogram method:
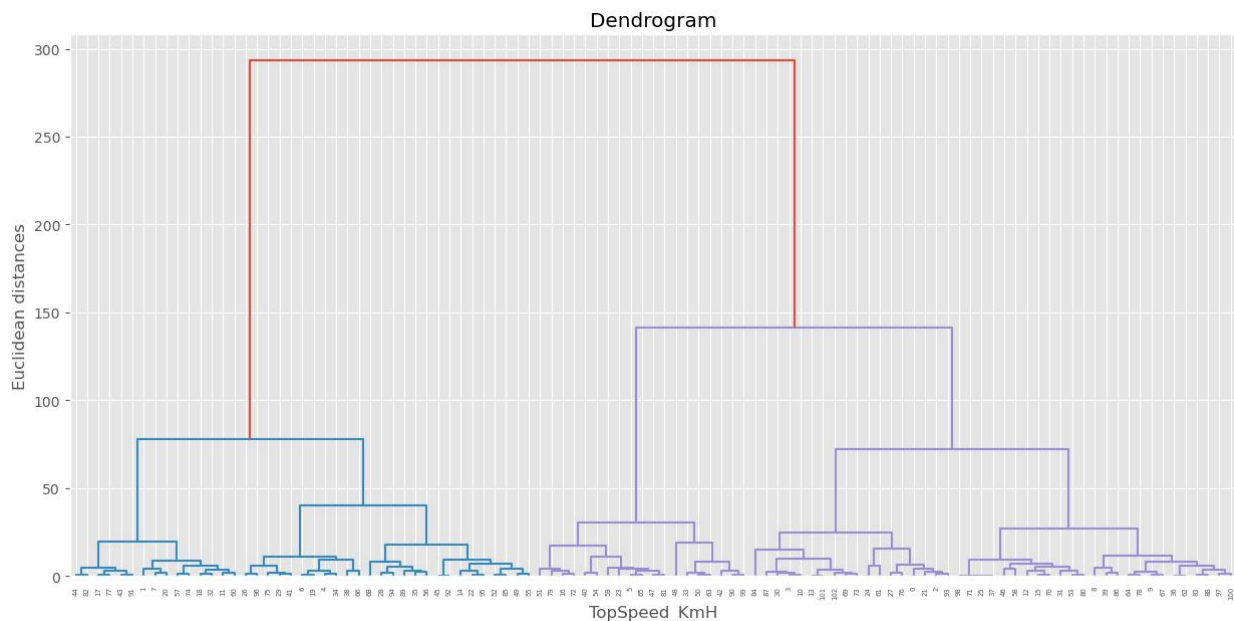
Plotting Clusters diagram for 5 clusters:
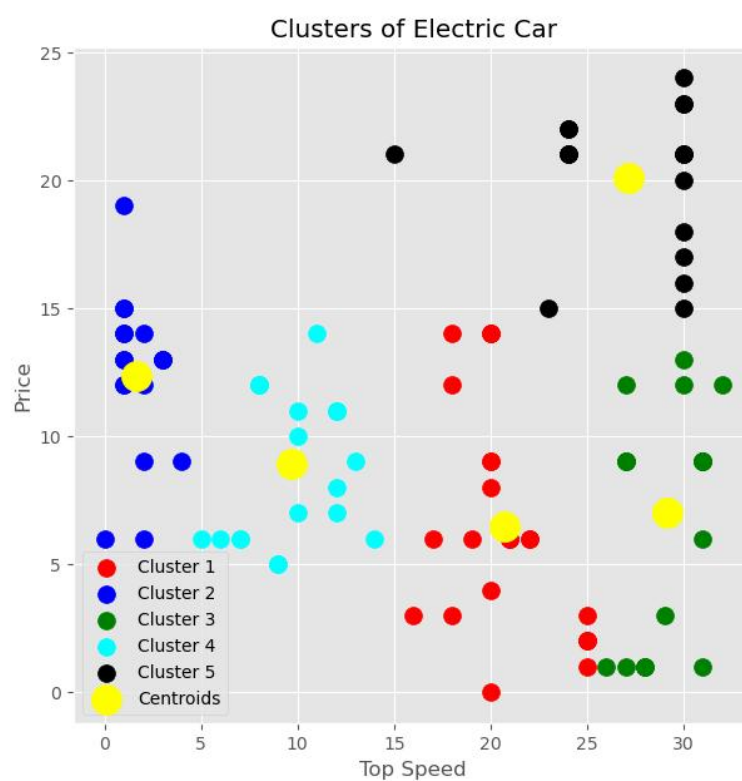
We formed such clusters for different features and following are the results:

Clusters between Brands and Range of the Vehicle:
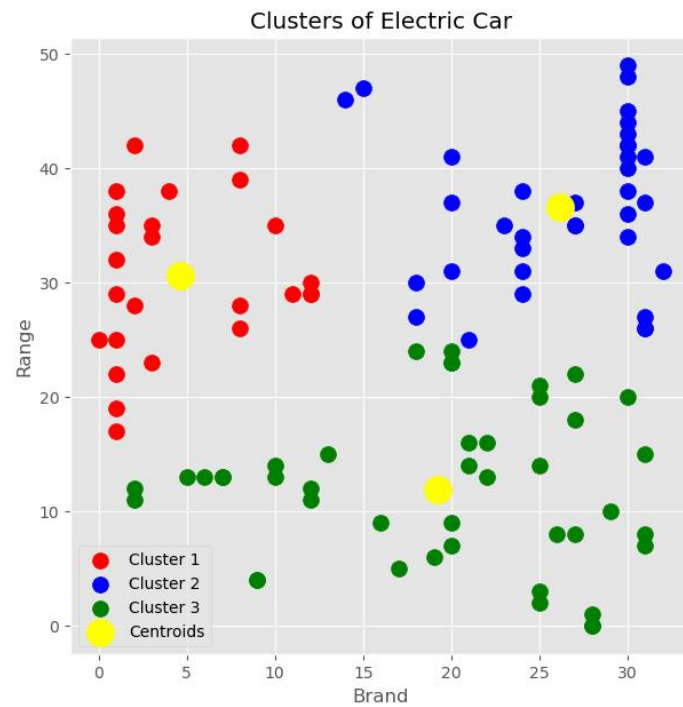
The clusters are all over the place for this graph. It shows almost all brands have Vehicles with less Range, mid-range, as well as high range vehicles.

Clusters between Brands and Top Speed of the Vehicles:
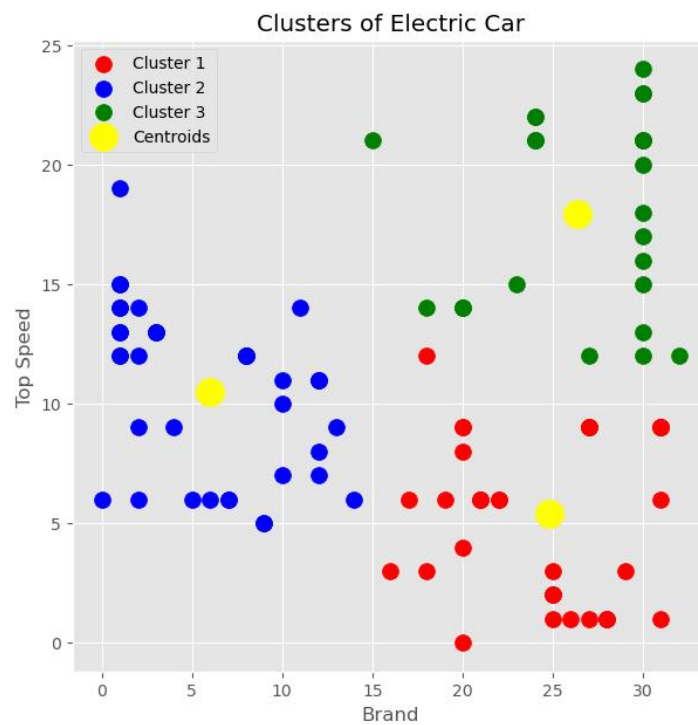
The brands can be classified into 3 clusters of low top speed, medium top speed and high-top speed.

Conclusion:

In conclusion, our data-driven analysis reveals the intricate tapestry of the electric vehicle market, highlighting the diversity of vehicles, consumers, infrastructure, and regulatory environments that define this transformative industry. The findings are there are majorly three segments of Electric Vehicle depending on the Acceleration, Top Speed, Efficiency, and price. First would be Super-fast sports vehicles catering to Luxury market, then there are mixed bag vehicles one's who has low top speed, low range and lower price and mixed efficiency and the other with high top speed, high range, and better acceleration and high prices.

Considering, Indian Vehicle Market which is very price sensitive. I think the targeting segment which has SUV or Sedan with lower price, low top speed, low range, and Type 2 CCS charging plug would be beneficial. We can also try to improve the Range of the vehicle by increasing price a little which could be deciding factor when choosing a vehicle in the Indian Market.

The findings of this report are essential for stakeholders across the automotive, energy, and policy sectors as they navigate the evolving landscape of sustainable mobility and work towards a more environmentally friendly transportation future.

MARKETING MIX

1. Product:
  - Product Range: Offer a diverse range of EV models, including compact cars, sedans, SUVs, and two-wheelers, to cater to various consumer preferences and needs.
  - Battery Technology: Highlight advanced battery technology for extended range and faster charging capabilities to address range anxiety concerns.
  - Charging Solutions: Provide home charging stations and collaborate with partners to establish a robust fast-charging network across urban centers.

2. Price:
  - Affordable Options: Introduce entry-level EV models with competitive pricing to target price-sensitive consumers. Leverage government incentives and subsidies to lower initial costs.
  - Flexible Financing: Partner with financial institutions to offer attractive financing options, including low-interest loans and lease-to-own programs.

3. Place:
  - Urban Presence: Focus on major metropolitan areas and urban hubs with higher population densities and greater potential for EV adoption.
  - Dealership Network: Establish a comprehensive network of dealerships and experience centers in key cities for convenient test drives, consultations, and after-sales service.
  - Online Sales Platform: Develop a user-friendly website and mobile app for online sales, reservations, and virtual showroom experiences.

4. Promotion:
  - Educational Campaigns: Launch nationwide campaigns to educate consumers about the benefits of EVs, emphasizing environmental impact, lower operational costs, and government incentives.
  - Incentives and Offers: Advertise available government subsidies, tax breaks, and special promotional offers for EV buyers.
  - Partnerships and Collaborations: Collaborate with state governments, utility companies, and private enterprises to expand charging infrastructure and offer bundled services like discounted electricity rates for EV owners.
  - Social Media Engagement: Leverage social media platforms to engage potential buyers, share success stories, and address queries and concerns.

5. People (Additional P):

  - Sales and Support Staff: Train sales and support teams to be knowledgeable about EV technology, charging options, and government policies to assist customers effectively.

  - Customer Service Excellence: Implement a responsive customer service program for prompt resolution of inquiries, maintenance scheduling, and post-purchase support.

6. Process (Additional P):

  - Efficient Purchase Process: Streamline the buying process with online configurators, transparent pricing, and simplified paperwork. Offer virtual consultations for remote customers.

  - Scheduled Maintenance and Repairs: Establish a structured system for scheduling maintenance and repairs to ensure timely service and minimize downtime for customers.

By implementing this marketing mix, manufacturers and marketers in the Indian EV market can effectively target and engage specific segments, capitalize on consumer preferences, and drive adoption of electric vehicles in the region. Additionally, continuously monitoring market trends and gathering customer feedback will enable adjustments to the marketing mix for optimal results.

CONCLUSION

1. Urban Professionals with High Disposable Income:
   - Demographic: Age 25-45, urban residents, high income earners.
   - Psychographic: Value sustainability, tech-savvy, seek premium features and designs.
   - Behavior: Likely to use vehicles for daily commuting, preference for luxury and status.
   - Geographic: Focus on major metropolitan areas with established charging infrastructure.

2. Environmentally Conscious Early Adopters:
   - Demographic: Diverse age groups, urban and suburban dwellers.
   - Psychographic: Strong environmental values, desire to reduce carbon footprint.
   - Behavior: Willing to pay a premium for eco-friendly options, actively seek out sustainable products.
   - Geographic: Target regions with a higher concentration of eco-conscious communities, like eco-friendly cities and towns.

3. Fleet Operators and Commercial Businesses:
   - Demographic: B2B segment, various business sizes, urban and suburban.
   - Psychographic: Interested in lowering operational costs, environmentally conscious, value reliability.
   - Behavior: Purchase in bulk, focused on total cost of ownership and efficiency.
   - Geographic: Focus on industrial and business districts, logistics hubs, and regions with high commercial activity.

4. Tech Enthusiasts and Innovators:
   - Demographic: Age 20-40, urban, middle to high-income.
   - Psychographic: Early adopters of new technologies, interested in cutting-edge features.
   - Behavior: Eager to try new products, value advanced technology and innovation.
   - Geographic: Concentrate marketing efforts in tech-savvy urban areas, including tech clusters and innovation hubs.

5. Budget-Conscious Consumers:
   - Demographic: Diverse age groups, urban and suburban, mid to low income.
   - Psychographic: Price-sensitive, looking for affordable options.

- Behavior: Prioritize cost-effectiveness, seek out government incentives and subsidies.
   - Geographic: Target regions with a higher concentration of budget-conscious consumers, including suburban areas and towns.

6. Rural and Semi-Urban Consumers:
   - Demographic: Diverse age groups, rural and semi-urban areas.
   - Psychographic: Value functionality, may be less concerned with premium features.
   - Behavior: Likely to use vehicles for daily transportation, may prioritize durability and reliability.
   - Geographic: Focus on regions with a mix of rural and semi-urban communities, where transportation needs are high.

7. Innovative Commuters:
   - Demographic: Urban professionals, age 25-45, middle to high income.
   - Psychographic: Value convenience, interested in new mobility solutions.
   - Behavior: Seek EVs for daily commutes, prioritize features like autonomous driving or smart connectivity.
   - Geographic: Concentrate efforts in urban centers with high commuter traffic, focusing on areas with congestion and high transportation needs.

By combining demographic, psychographic, behavioral, and geographic analysis, we can target our marketing efforts more effectively, ensuring that our messaging and offerings resonate with specific segments in their respective regions. It is necessary continually monitor and adapt our strategies based on market feedback and evolving consumer preferences.

GITHUB LINKS

KSHITIJ ADESH JADHAV

https://github.com/Kshitij-2107/EV-Market-Segmentation/blob/5cf729c7ea2f5521230ab7f65d312078967e6447/EV%20market%20segmentation%20analysis.ipynb

IRFAN WAHID

https://github.com/wahid-irfan/EV-MARKET-GEOGRAPHIC-SEGMENTATION-IRFAN/blob/594fecfc53621671af6b9ff0efcb6a5c78056871/EV_Geographic_Segmentation_RFAN%20WAHID.ipynb

ATIF SHAIK

https://github.com/Atifbeast/Feynn-Internship-Project_02-implementation/blob/a114b52d05a87db5116e3a901dae9523d4d429b8/Feynn_Labs_Project_02.ipynb

ANIKET BABURAO MANKAR

https://github.com/aniketbmankar/Electric_Vehicle_Segmentation/blob/d7a7b0bf3c553f2f3d09f699c879c610c236f43a/EV_Segmentation.ipynb