# Market Segmentation Analysis Report for Electric Vehicle Market in India

By Vaduguru Venkata Uday Kiran Sarma

6/7/2024

## Introduction

This report presents the analysis of the Electric Vehicle (EV) market in India using segmentation analysis. The goal is to identify key market segments and develop a feasible strategy for an EV startup to target the segments most likely to use electric vehicles.

## Problem Statement

As an EV startup, we need to determine the appropriate vehicle/customer space to develop our EVs. This analysis aims to segment the EV market in India and identify the most promising segments for market entry.

## Methodology

The analysis involved several steps:

1. Data Collection:
    - A consumer buying behavior dataset (ev_dataset1.csv) containing information on demographics, psychographics, financial attributes, and car purchase details was used.
    - Additionally, a state-wise sales dataset (ev_dataset2.csv) provided insights into geographic distribution.
2. Data Preprocessing:
    - Exploratory data analysis was conducted to understand data characteristics and identify missing values or outliers.
3. Feature Engineering:
    - Categorical features like profession and marital status were encoded numerically.
    - Standard scaling was applied to numerical features to ensure they contribute equally to the clustering process.
4. Segmentation Analysis:
    - K-means clustering was performed to segment customers into distinct groups based on their similarities in features.
    - The Elbow Method was used to determine the optimal number of clusters.

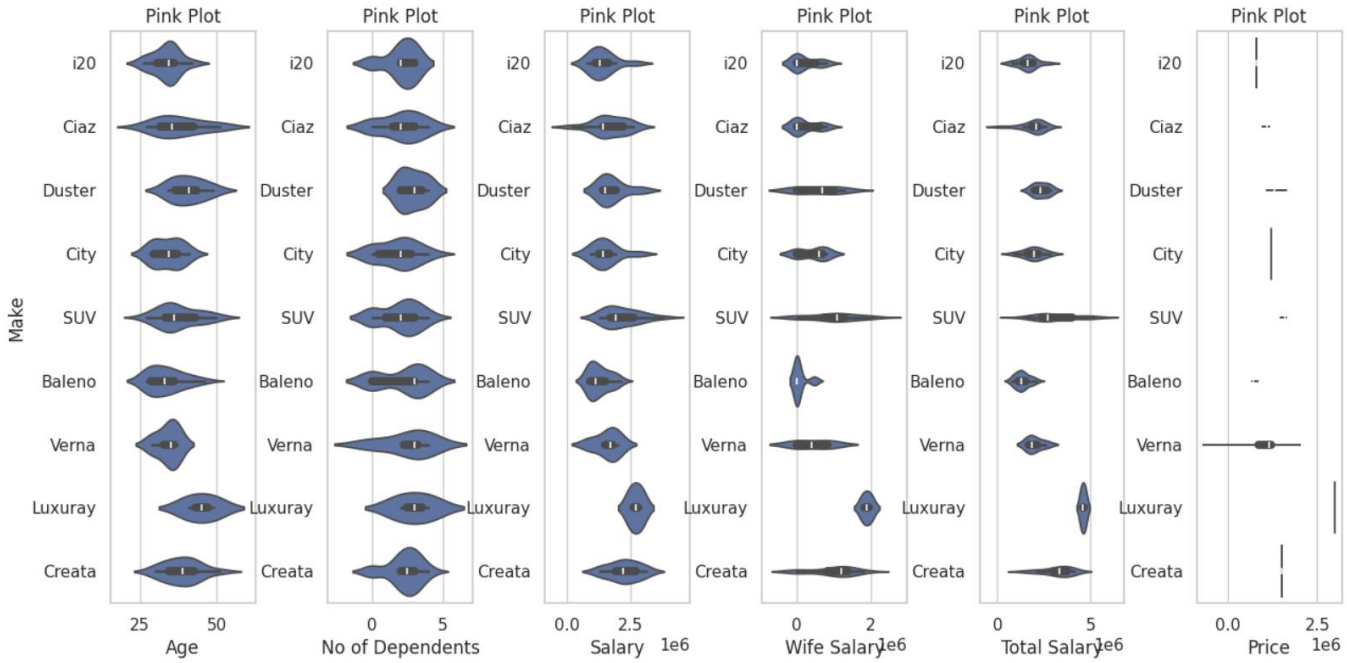
## Data Collection and Preprocessing

The dataset used for this analysis, `ev_dataset1.csv and ev_dataset2.csv`, contains various attributes of vehicles as well as locations.

The analysis relied on two datasets:

- ev_dataset1.csv: This dataset contained information on individual consumers, including demographics (age, dependents), psychographics (profession, education), financials (salary, loans), and car purchase details (make, price).
- ev_dataset2.csv: This dataset provided state-wise sales data for different categories of electric vehicles.

**Behavorial and Psychographic Analysis:**




***Conclusion from above Pink Plots:**

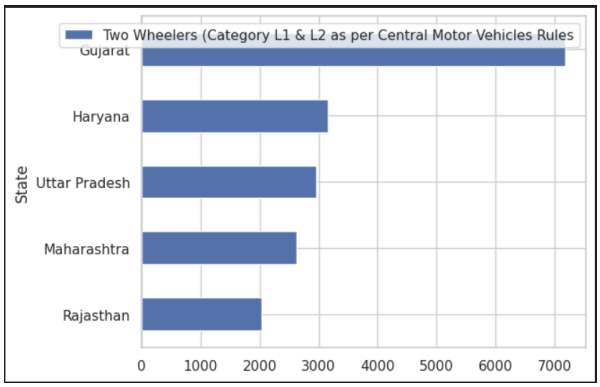
- Customer less than age 25 purchase less expensive cars.
- If numbers of dependents are more consumers are likely to buy cars having more number of seats like SUV's.

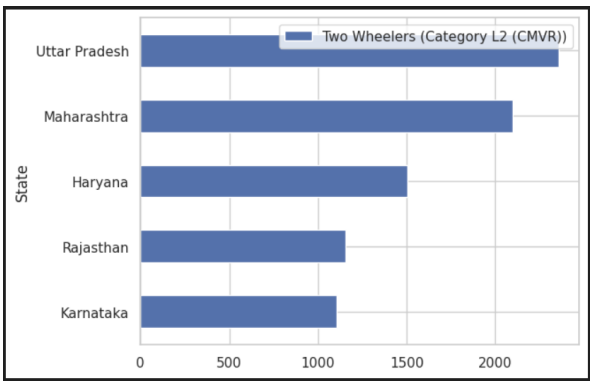
## Feature Engineering

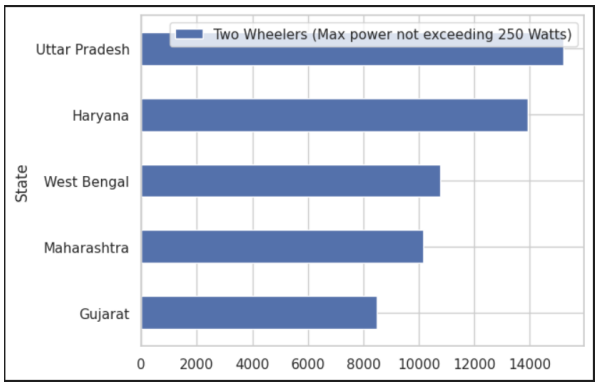
Categorical features like profession and marital status were converted into numerical values using label encoding. Standard scaling was applied to numerical features to ensure all features have a similar weight during the clustering process.

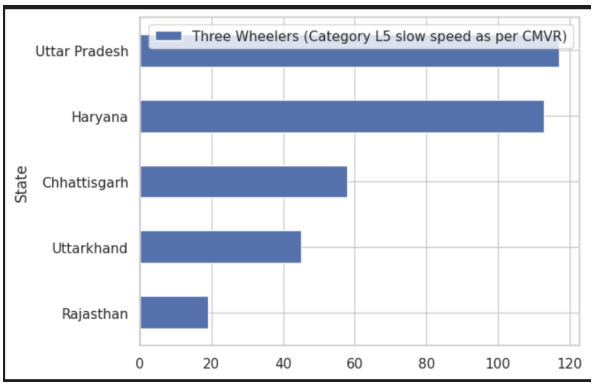
## Geographic Analysis and Data Visualisation:

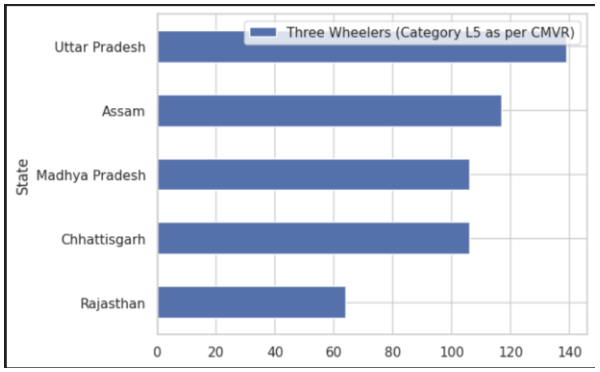
For ev_dataset2.csv, data visualisation of Top 5 states for each category of Electric Vehicles following are images of results:

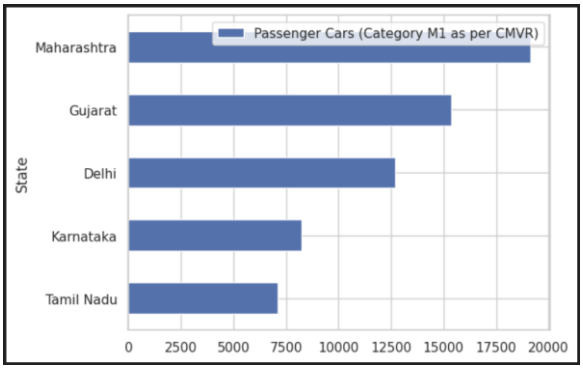


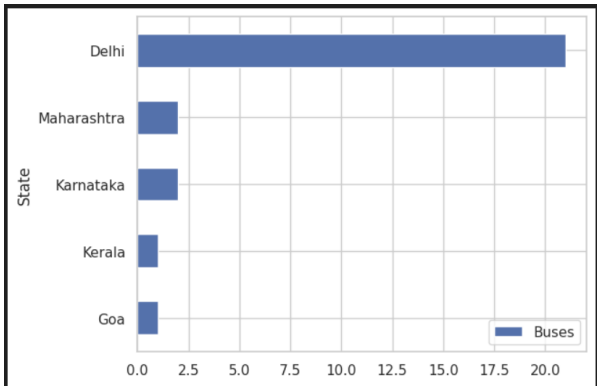



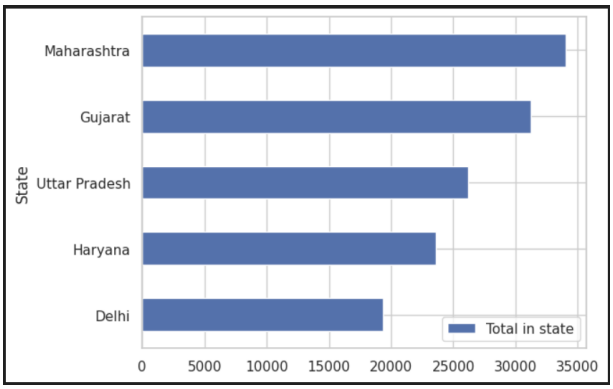



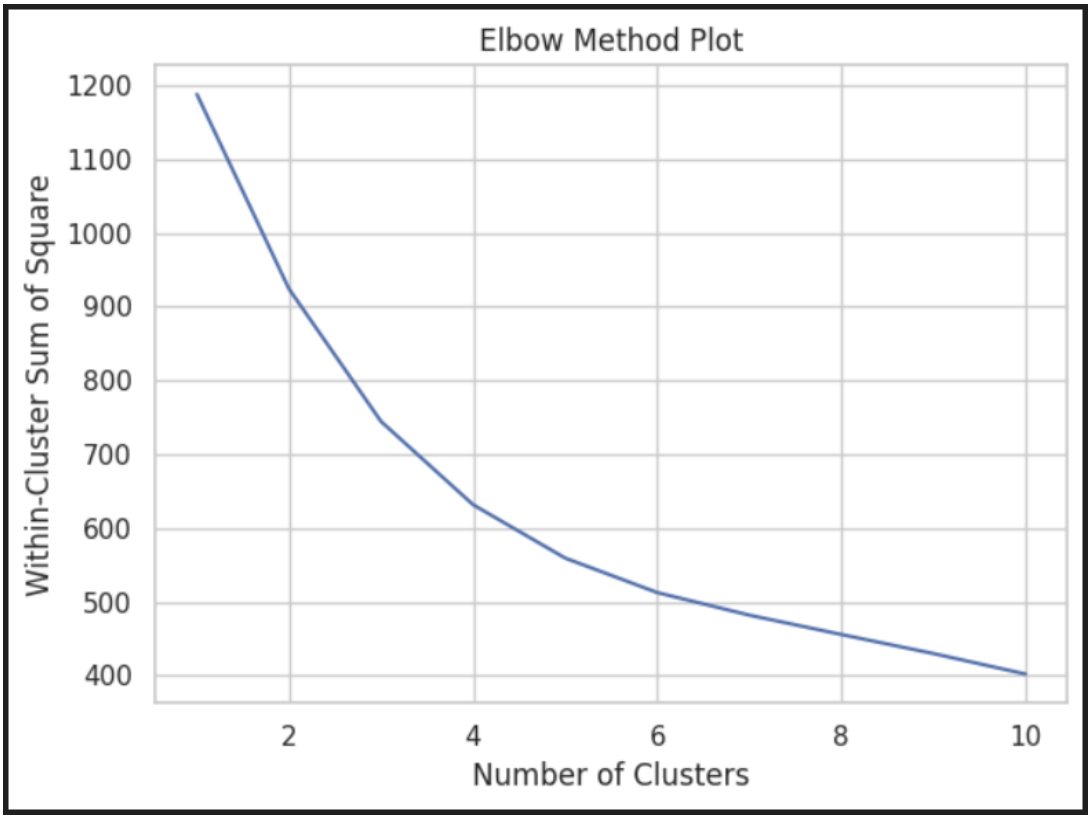



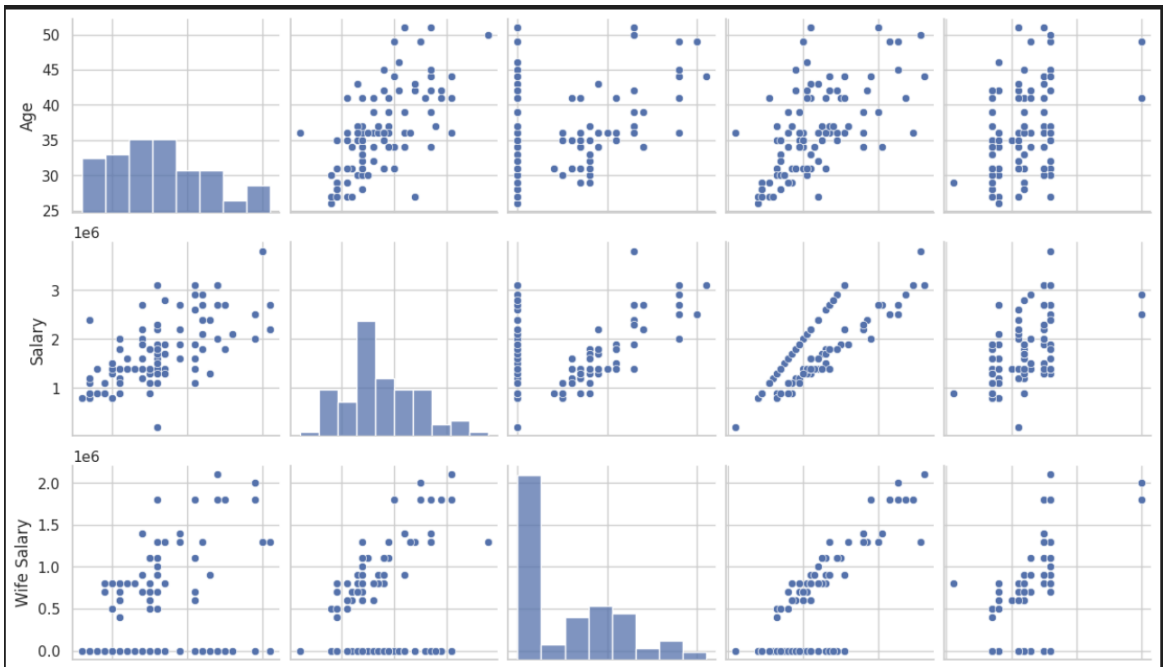
## Segmentation Analysis

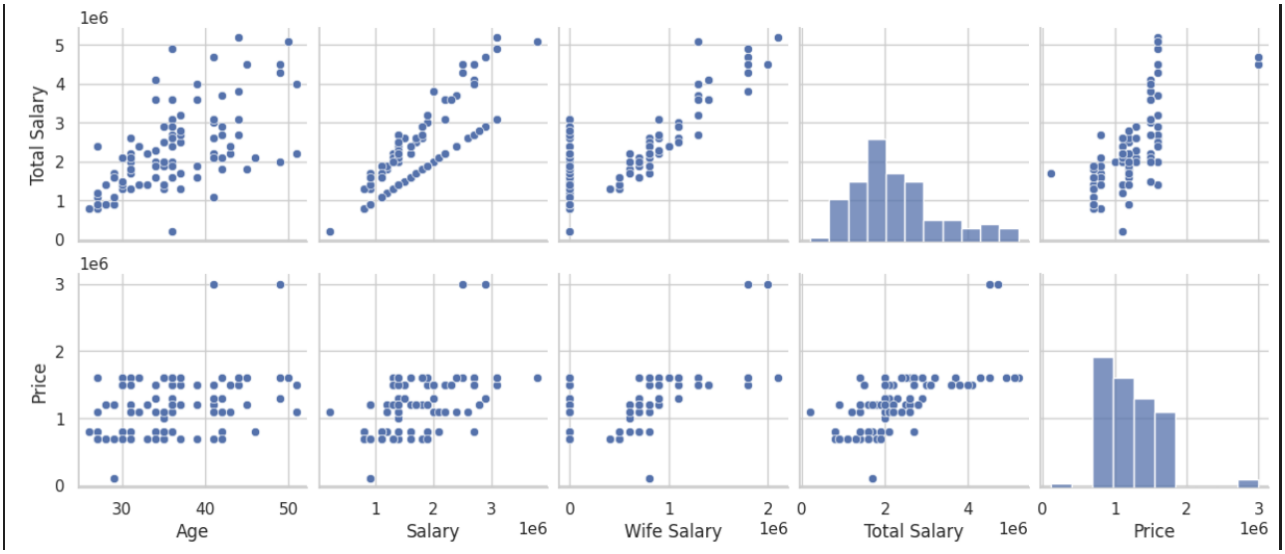
K-means clustering was employed to segment customers into distinct groups based on their similarities in features. The Elbow Method was used to identify the optimal number of clusters, which was determined to be five.

Elbow Method Plot :




K-means Clustering results:






## Results

The analysis yielded several key findings:

- **Demographics:** Younger customers tend to purchase less expensive cars, while those with more dependents favor vehicles with higher seating capacity.
- **Psychographics:** A correlation exists between salary and car price, suggesting a direct relationship between purchasing power and car selection.
- **Financial Attributes:** Customers with personal or house loans may exhibit different car purchase behavior compared to those without such loans.

### Geographic Analysis

The state-wise sales data provided insights into regional variations in EV adoption. States with higher sales volumes for a specific EV category present potential target markets for focused marketing efforts.

### Strategy Formulation

Based on the segmentation results, automakers can develop targeted marketing strategies for each customer segment. This may involve:

- Tailoring messaging and communication channels to resonate with specific segment preferences.
- Developing product offerings that cater to the needs and budget constraints of each segment.
- Implementing differentiated pricing strategies based on segment price sensitivity.

## Conclusion

This analysis successfully segmented the EV market based on customer demographics, psychographics, and financial attributes. The identified segments provide valuable insights for automakers to develop targeted marketing strategies and optimize their reach within the EV market.

The Indian EV market presents significant opportunities for growth and expansion. By focusing on these key market segments, developing market-specific EVs, our EV startup can successfully enter and thrive in the market.

**Github link-** udaykiranvvs/FeynnLabs_Report (github.com)