EV Market Segmentation Report

Team Members:

- **Retheck DJ** (Solo Project)

1. Fermi Estimation (Breakdown of Problem Statement):

The problem involves understanding the market for Electric Vehicles (EVs) in India by analysing the data to extract insights regarding the concentration of EV manufacturers across various states and places. The segmentation will focus on understanding patterns based on geographical, demographic, and behavioural factors.

2. Data Sources:

The dataset for the project was obtained from Kaggle, specifically the following datasets:

- **India EV Market Data**
    - This dataset contains information about various EV manufacturers and their distribution across different states and places in India.

3. Data Pre-processing (Steps and Libraries Used):

- **Libraries Used:**
    - pandas, matplotlib, seaborn, sklearn
- **Pre-processing Steps:**
    - **Missing Data Handling:** Checked for missing values and handled them appropriately by dropping or filling missing data.
    - **Data Cleaning:** Removed invalid entries and converted date columns to appropriate formats.
    - **Feature Engineering:** Converted categorical data to numeric representations where needed.

4. Segment Extraction (ML Techniques Used):

The machine learning technique used for segmentation was **KMeans clustering**. This technique was applied to segment customer data based on **Age**, **Annual Income**, and **Spending Score**.

- **Steps Taken:**
    - **Standardization:** The data was standardized using the StandardScaler from the sklearn library.
    - **Clustering:** Applied **KMeans clustering** to partition the data into **5 clusters**.
    - **Cluster Analysis:** Visualized and analysed each cluster to gain insights into the customer distribution and behaviours.
- **Results:**
    - The segmentation helped in identifying different customer segments based on their age, income, and spending habits, providing valuable insights for targeting specific customer groups.

5. Profiling and Describing Potential Segments:

After clustering the data, the following key insights were extracted for each of the 5 segments:

- **Cluster 1:** Young, low-income individuals with a high spending score.
- **Cluster 2:** Middle-aged individuals with moderate income and moderate spending behaviour.
- **Cluster 3:** Older individuals with high income but lower spending scores.

- **Cluster 4:** Young professionals with average spending but relatively high income.
- **Cluster 5:** Mixed age group with low income and low spending score.

6. Selection of Target Segment:

Based on the analysis, **Cluster 4** (Young professionals with moderate income and average spending behaviour was selected as the target segment for marketing, as this group demonstrates a good balance between purchasing power and interest in EVs.

7. Customizing the Marketing Mix:

- **Product:** Focus on affordable EV models with features suitable for urban professionals.
- **Price:** Set a competitive price range to appeal to the middle-income group.
- **Place:** Target metropolitan areas where this demographic is concentrated.
- **Promotion:** Use online and digital marketing channels to reach young professionals who are tech-savvy and value sustainability.

8. Potential Customer Base in the Early Market:

- Based on the segmentation, the potential customer base for **Cluster 4** is estimated to be around **50,000 individuals** across the top metropolitan cities in India. Assuming a target price range of **INR 10,00,000 to INR 12,00,000**, the potential profit can be calculated as:

Potential Customer Base * Target Price Range = Potential Profit
50,000 * 10,00,000 = INR 500,00,00,000 (INR 500 Crores)

9. The MOST OPTIMAL MARKET SEGMENTS:

Based on the **Segmentation Analysis** and **KMeans Clustering**, **Cluster 4** (Young professionals) emerged as the **most optimal segment** for targeting in the early stages of market penetration due to their willingness to adopt EV technology and disposable income for such products.

10. Link to GitHub Profile with Codes and Datasets Well Documented:

https://github.com/retheck/projects/blob/main/MARKET%20SEGMENTATION%20PROJECT.ipynb

All the code and datasets used for this analysis are well documented on the provided GitHub link. This includes:

- Data cleaning and pre-processing scripts.
- Exploratory data analysis (EDA) and visualization code.
- Clustering and segmentation analysis with detailed documentation of each step.

Summary:

This project analysed the **Indian Electric Vehicle (EV) market** and used **KMeans clustering** to segment the customer base based on demographics. The optimal customer segment was identified, and marketing strategies were customized accordingly to target this segment. Further, the report includes insights from the segmentation analysis, providing a detailed approach to how the market can be approached with tailored marketing efforts.