EV MARKET SEGMENTATION
BASED ON
GEOGRAPHY AS A VARIABLE

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1. Executive Summary:

Based on data from 22 Indian states, I performed market segmentation to identify the best regions for Electric Vehicle (EV) investment and growth.

2. Methodology:
We used the following tools and libraries:

- Python (Pandas, NumPy) for data wrangling
- Scikit-learn (KMeans, StandardScaler, Silhouette Score) for clustering
- PCA for reducing dimensionality
- Matplotlib & Seaborn for visualization

Steps:

- Cleaned and scaled the dataset
- Encoded categorical EV policy feature
- Used Elbow Method and Silhouette Score to choose optimal clusters
- Applied KMeans Clustering
- Visualized results using PCA

3. Visualisation:

- **Elbow Curve:**

  Shows the optimal number of clusters by detecting the "elbow" point. In our case, the curve bends at **k = 3**, suggesting that number of clusters.
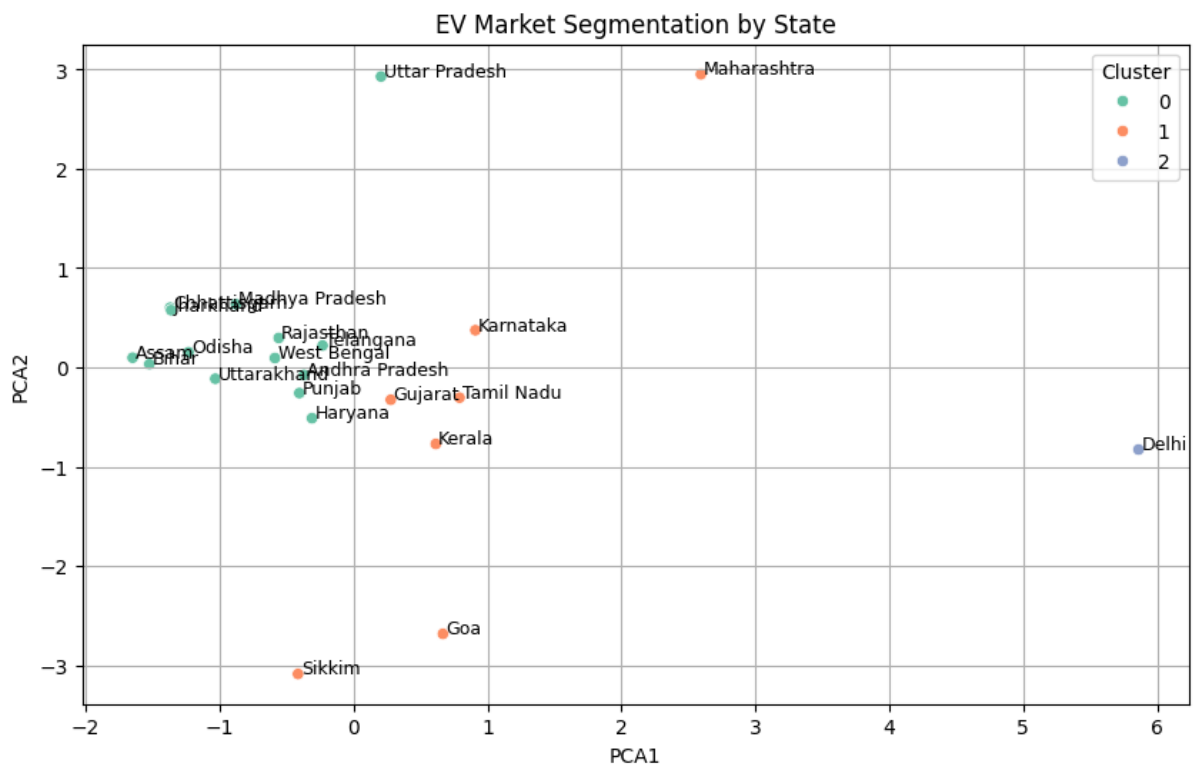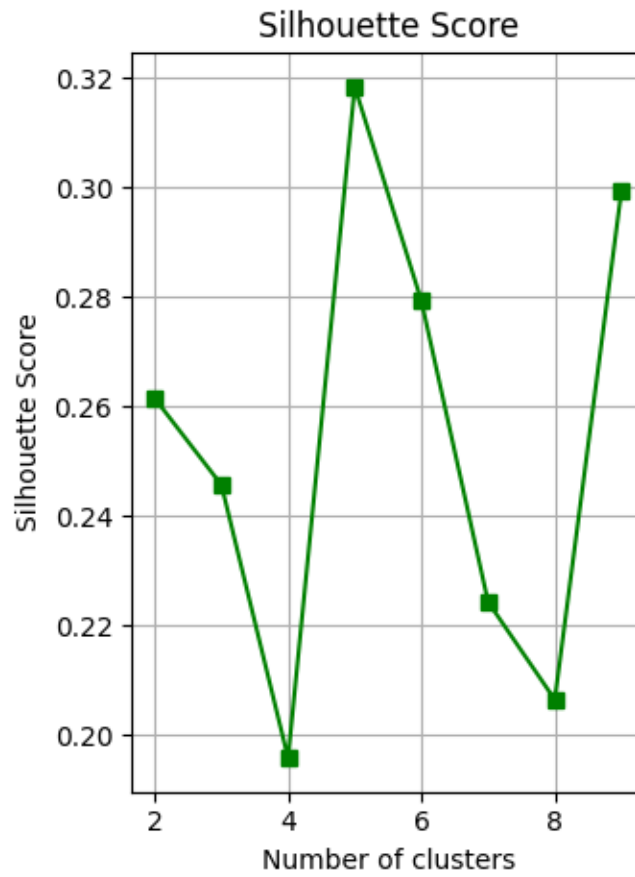
Elbow Method
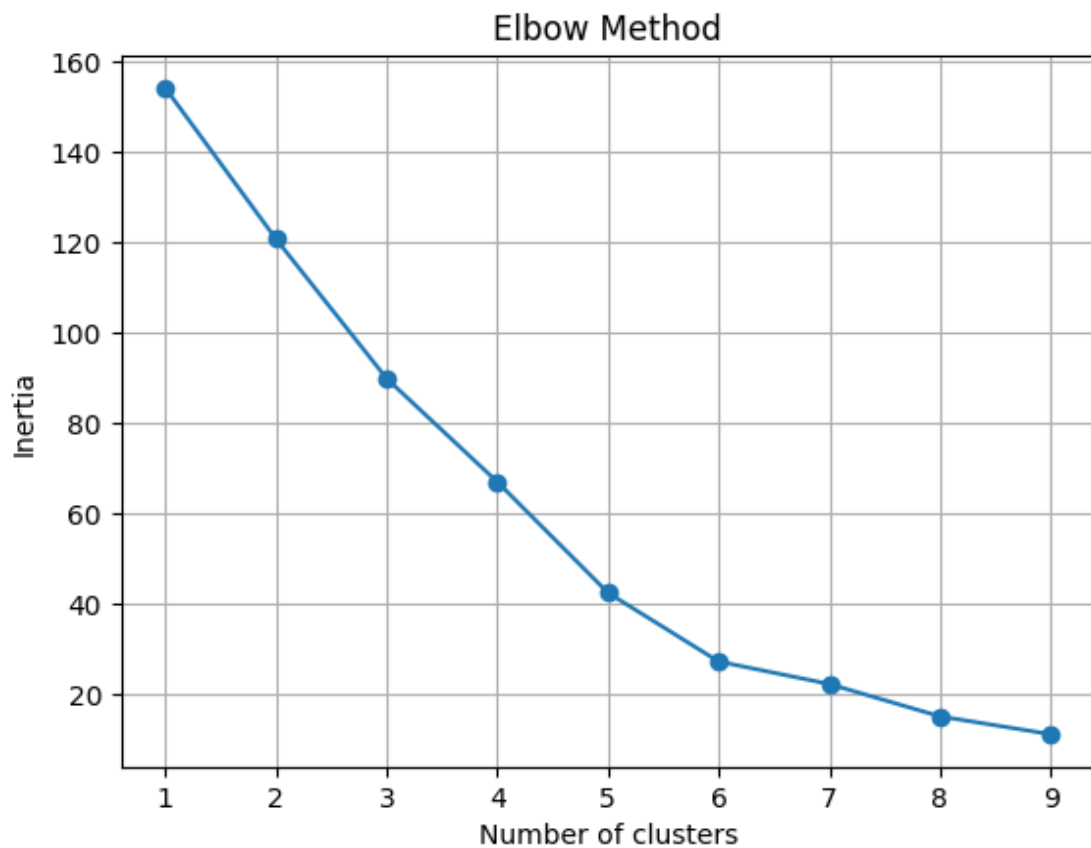
- **Silhouette Score:**
  Used to evaluate the quality of clusters. Scores closer to 1 imply well-separated clusters. Peak observed at k = X.

- **PCA Cluster Visualisation:**
  Plotted 2D representation of high-dimensional data. Clear separations show clusters with different EV adoption potential.

Silhouette Score

EV Market Segmentation by State

4. Cluster Analysis:

```
Cluster Summary:
         Total_EVs  Charging_Stations  Per_Capita_Income  \
Urbanization
Cluster
0          72404.5         275.142857       142563.785714
  26.721429
1          99780.0         886.571429       369266.142857
  44.114286
2         150000.0        1886.000000       430120.000000
  97.500000

           Population_Density      Bill  Ev_Policy
Cluster
0                  475.142857  5.928571   0.928571
1                  412.285714  5.685714   0.714286
2                11312.000000  5.000000   1.000000

Best Performing States for EV Market:
['Delhi']
addCode
addText
```

We can see from cluster analysis that the best-performing state for the EV market is Delhi, considering factors such as policy, per capita income, population density, and so on.

5. Recommendation:

We recommend investing in or promoting EV infrastructure and marketing in:

Delhi demonstrates the most favorable conditions for EV growth.

Github Repository link:

https://github.com/Benarjeechowdary/EV-Market-Segment