**BEHAVIORAL SEGMENTATION REPORT**

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Behavioural segmentation divides a dataset into groups based on behavioral patterns. It helps identify clusters that can be used for applications like targeted marketing, personalized recommendations, or improving customer retention.

The dataset in this analysis includes behavioural metrics such as engagement levels, purchasing habits, and activity frequency. The goal is to uncover patterns and clusters that provide actionable insights for strategic decisions.

1. **METHODS**
2. **DATA PREPROCESSING**

* Missing data was filled using statistical methods like mean or median.
* Features were standardized to a common scale using Z-score normalization.
* Principal Component Analysis (PCA) reduced the number of variables while keeping most of the data’s information.

1. **CLUSTERING TECHNIQUES**

* **K-Means Clustering:**
* The elbow method was employed to determine the optimal number of clusters by evaluating the sum of squared distances within clusters.
* K-Means was selected due to its computational efficiency and effectiveness for larger datasets.
* **Hierarchical Clustering:**
* Agglomerative clustering was performed to explore the hierarchical relationships between data points.
* Dendrograms were used to visualize the clustering process and validate the results obtained from K-Means.

1. **MODEL EVALUATION**

* **Silhouette Score:** This metric was calculated to assess the cohesion and separation of clusters, providing insights into their quality.
* **Cluster Visualization:** Tools such as t-SNE and PCA plots were used to visualize the distribution of clusters and assess their interpretability.

1. **RESULTS**

* ***Key Findings***

The dataset was divided into *N clusters* based on the elbow method. Each cluster showed distinct patterns:

* **Cluster A:** High engagement but low purchasing.
* **Cluster B:** Steady purchases with moderate engagement.
* **Cluster C:** Sporadic activity but high spending.

Visualizations confirmed clear separations between clusters, demonstrating the segmentation's reliability.

* ***Visual Insights***
* PCA plots showed that clusters were well-separated in the reduced-dimensional space.
* Hierarchical clustering used a dendrogram to show relationships between data points and verify the clustering.

1. **CONCLUSION**

Behavioral segmentation helps the EV market by allowing companies to better understand and target specific customer needs. It enables more tailored marketing strategies, product offerings, and improved customer experiences, leading to greater adoption and growth of electric vehicles.