**Customer Behavior Analysis Model**

**1. Overview:**

Customer Behavior Analysis model that utilizes various machine learning techniques, including clustering, to analyze customer behavior based on their purchase reviews.

**2. Goal & Objectives:**

Objective: Analyze and understand customer behavior patterns derived from an ecommerce platform survey data.

**3. Data:**

Dataset: Comprises 602 entries and over 20 features capturing customer behavior on the ecommerce platform.

Preprocessing: Involved data cleaning and label encoding for further analysis.

**4. Exploratory Data Analysis (EDA):**

Correlation Analysis: Identified features with high and low correlations, visually represented via a heatmap.

Insights:

Review Patterns: Noted that satisfied customers tend to leave more reviews than unsatisfied ones.

Age Distribution: Highlighted that the 15-25 age group constitutes over half the customer population.

Gender Impact: Female customers exhibit a higher likelihood of purchasing products.

**5. Feature Selection & Preprocessing:**

ANOVA: Used for feature selection, retaining the 10 most relevant features and discarding the rest.

Data Preparation: Performed oversampling and scaling for model training.

**6. Machine Learning Models:**

Model Performance:

KNN: Achieved the highest accuracy at 79%, followed by SVC (73%), Decision Trees (76%), Random Forest (78%), and XGBoost (76%).

Hyperparameter Tuning: Employed grid search to optimize model performance.

**7. Evaluation Metrics:**

Classification Report: Utilized for evaluating each model's performance based on precision, recall, and F1-score.

**8. Clustering Analysis:**

Features Used: Focused on two particular features ‘browsing frequency’ and ‘shopping satisfaction’ for clustering.

Determining Clusters: Employed the elbow method, identifying 4 clusters via KMeans Clustering.

Analysis: Examined the distribution of data points within each cluster to understand the relationship between browsing frequency and shopping satisfaction.

**9. Insights & Findings:**

Conclusions drawn from the analysis, including customer segment characteristics and their behavior patterns.

In general, people who browse multiple times a week tend to have average to higher levels of satisfaction.

**10. Usage & Applications:**

Application: Insights derived can inform marketing strategies, product development, and customer engagement initiatives.