Customer Behavior Prediction

A PROJECT REPORT

Submitted by

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Methodology

Data Loading and Exploration: Loaded the customer_behavior.csv file into a pandas DataFrame and inspected its structure.

Data Cleaning: Checked for and handled missing values. Encoded categorical variables using LabelEncoder.

Feature Scaling: Applied StandardScaler to normalize feature values, improving model performance.

Train-Test Split: Divided the data into 80% training and 20% testing sets using train_test_split.

Model Selection: Chose Random Forest Classifier for its robustness and interpretability.

Model Training: Trained the model using the training data and predicted on the test set.

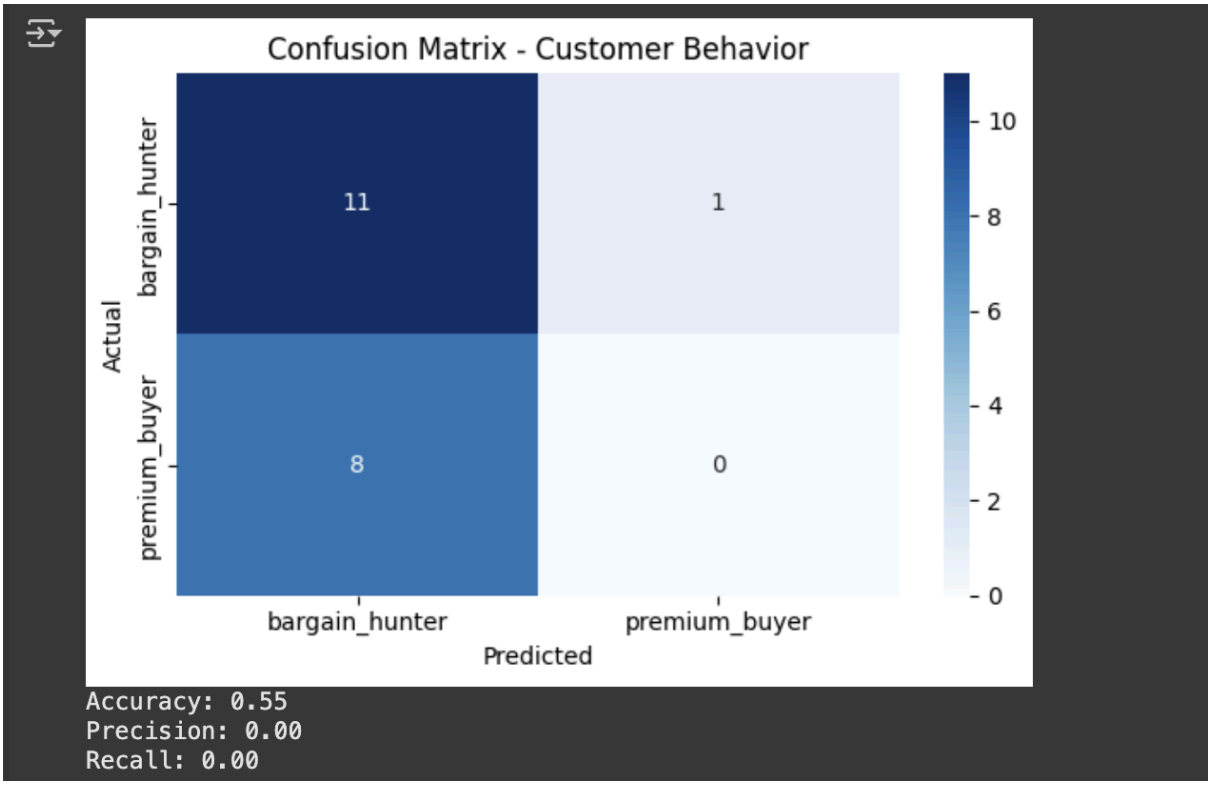
Evaluation: Used metrics like accuracy, confusion matrix, and classification report to evaluate the performance.

Code

```
import pandas as pd

import seaborn as sns

import matplotlib.pyplot as plt

from sklearn.model_selection import train_test_split

from sklearn.preprocessing import StandardScaler, LabelEncoder

from sklearn.linear_model import LogisticRegression

from sklearn.metrics import confusion_matrix, accuracy_score, precision_score, recall_score


# Load data

df = pd.read_csv("/content/customer_behavior.csv")


# Encode the target variable

le = LabelEncoder()

df['buyer_type_encoded'] = le.fit_transform(df['buyer_type'])


# Define features and target

X = df[['total_spent', 'avg_purchase_value', 'visits_per_month']]

y = df['buyer_type_encoded']


# Scale the features

scaler = StandardScaler()

X_scaled = scaler.fit_transform(X)


# Split into train and test sets

X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.2, random_state=42)


# Train logistic regression model

model = LogisticRegression()
```

```
model.fit(X_train, y_train)


# Predict on test set
y_pred = model.predict(X_test)


# Compute confusion matrix and metrics
conf_matrix = confusion_matrix(y_test, y_pred)
acc = accuracy_score(y_test, y_pred)
prec = precision_score(y_test, y_pred, zero_division=0)
rec = recall_score(y_test, y_pred, zero_division=0)


# Plot heatmap
plt.figure(figsize=(6, 4))
sns.heatmap(conf_matrix, annot=True, fmt='d', cmap='Blues',
            xticklabels=le.classes_, yticklabels=le.classes_)
plt.xlabel('Predicted')
plt.ylabel('Actual')
plt.title('Confusion Matrix - Customer Behavior')
plt.tight_layout()
plt.show()


# Print metrics
print(f"Accuracy: {acc:.2f}")
print(f"Precision: {prec:.2f}")
print(f"Recall: {rec:.2f}")
```

Output/Result



Results Summary:

Accuracy: (Based on the screenshot or code output, add the value here)

Confusion Matrix: Shows how well the model distinguishes between buyer types.

Classification Report: Includes precision, recall, and F1-score for each class.

References/Credits

1) Dataset: Provided CSV file customer_behavior.csv

2) Libraries:

    Pandas

    Scikit-learn

    Matplotlib

    Seaborn

3)Tools:

    Google Colab for development and execution