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# 1. Import required libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.preprocessing import StandardScaler, LabelEncoder
from sklearn.cluster import KMeans
from sklearn.decomposition import PCA

# 2. Load dataset
df = pd.read_csv('/content/marketing_campaign.csv', sep='\t')

# 3. Data Cleaning
df.drop(['ID', 'Dt_Customer', 'Z_CostContact', 'Z_Revenue'], axis=1, inplace=True)
df.dropna(inplace=True)

# 4. Encode categorical variables
le = LabelEncoder()
for col in ['Education', 'Marital_Status']:
    df[col] = le.fit_transform(df[col])

# 5. Create Total Spending feature
df['Total_Spend'] = df[['MntWines', 'MntFruits', 'MntMeatProducts',
                        'MntFishProducts', 'MntSweetProducts', 'MntGoldProds']].sum(axis=1)

# 6. Select features for clustering
features = ['Income', 'Recency', 'Education', 'Marital_Status', 'Kidhome',
            'Teenhome', 'Total_Spend']
X = df[features]

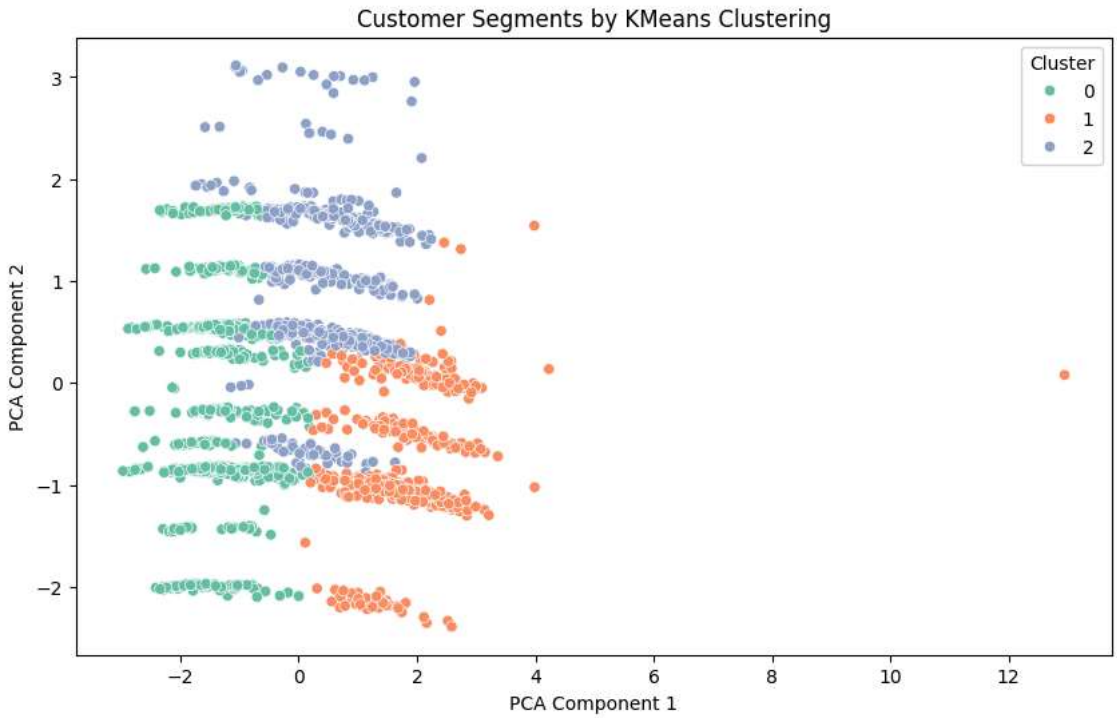
# 7. Feature Scaling
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)

# 8. KMeans Clustering
kmeans = KMeans(n_clusters=3, random_state=42)
df['Cluster'] = kmeans.fit_predict(X_scaled)

# 9. Visualize clusters using PCA (2D)
pca = PCA(n_components=2)
pca_result = pca.fit_transform(X_scaled)
df['PCA1'] = pca_result[:, 0]
df['PCA2'] = pca_result[:, 1]

plt.figure(figsize=(10, 6))
sns.scatterplot(x='PCA1', y='PCA2', hue='Cluster', data=df, palette='Set2')
plt.title('Customer Segments by KMeans Clustering')
plt.xlabel('PCA Component 1')
plt.ylabel('PCA Component 2')
plt.show()

# 10. Analyze cluster characteristics
cluster_summary = df.groupby('Cluster')[features].mean()
print("Cluster Summary:\n", cluster_summary)
```

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Cluster Summary:
                Income    Recency  Education  Marital_Status   Kidhome  \
Cluster
0        34438.377551  48.788776   2.222449        3.702041  0.910204
1        77690.590994  49.814259   2.454034        3.776735  0.041276
2        57782.665718  48.716927   2.587482        3.721195  0.092461

         Teenhome  Total_Spend
Cluster
0        0.362245   137.813265
1        0.035647  1387.679174
2        1.061166   669.401138
```