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TASK -8

CODE:

[3]:
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import pandas as pd
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn.metrics import silhouette_score
from sklearn.preprocessing import StandardScaler
from sklearn.decomposition import PCA

data = pd.read_csv(r"C:\Users\julug\Downloads\Mall Customer Segmentation Data.csv")

X = data[['Annual Income (k$)', 'Spending Score (1-100)']]

scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)

pca = PCA(n_components=2)
X_pca = pca.fit_transform(X_scaled)

inertias = []
K_range = range(1, 11)

for k in K_range:
    kmeans = KMeans(n_clusters=k, random_state=42)
    kmeans.fit(X_scaled)
    inertias.append(kmeans.inertia_)

plt.figure(figsize=(8, 4))
plt.plot(K_range, inertias, marker='o')
plt.title('Elbow Method For Optimal K')
plt.xlabel('Number of clusters (K)')
plt.ylabel('Inertia')
plt.grid(True)
plt.show()

optimal_k = 5
kmeans = KMeans(n_clusters=optimal_k, random_state=42)
cluster_labels = kmeans.fit_predict(X_scaled)
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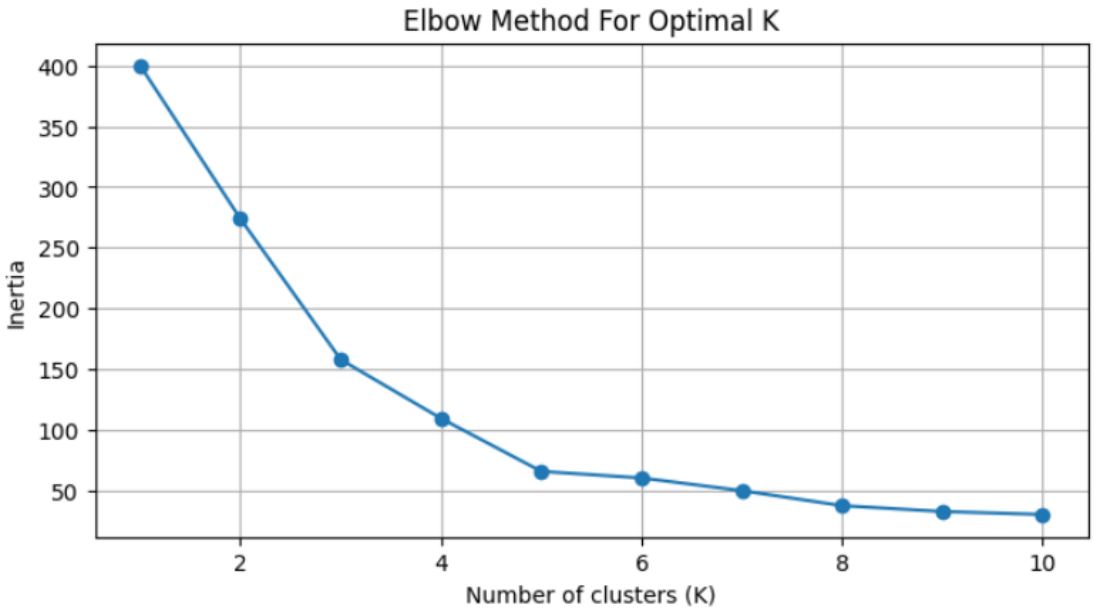
cluster_labels = kmeans.fit_predict(X_scaled)

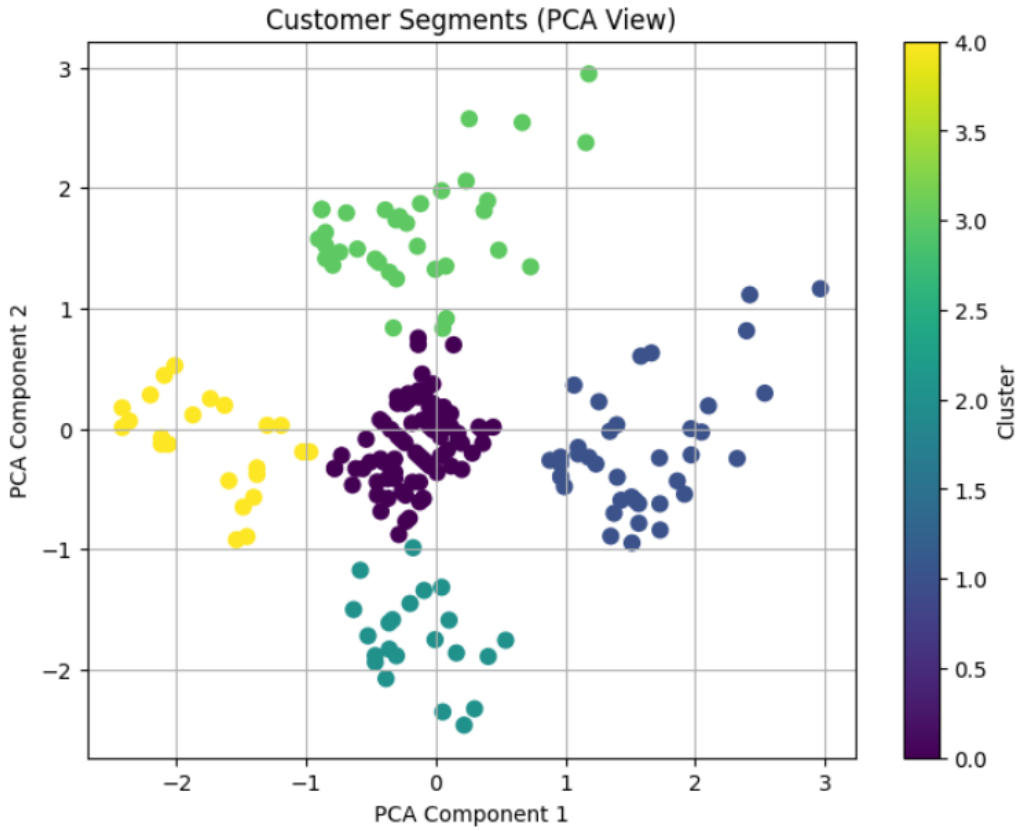
data['Cluster'] = cluster_labels

plt.figure(figsize=(8, 6))
plt.scatter(X_pca[:, 0], X_pca[:, 1], c=cluster_labels, cmap='viridis', s=50)
plt.title('Customer Segments (PCA View)')
plt.xlabel('PCA Component 1')
plt.ylabel('PCA Component 2')
plt.colorbar(label='Cluster')
plt.grid(True)
plt.show()

score = silhouette_score(X_scaled, cluster_labels)
print(f'Silhouette Score for K={optimal_k}: {score:.2f}')
```

OUTPUT:





Silhouette Score for K=5: 0.55