1BM24AI415

May 16, 2025

[6]:
```
#SVM #LAB-4A
import numpy as np
import pandas as pd
from sklearn import svm
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
iris = pd.read_csv('iris.csv')

X = iris.iloc[:, :-1]
y = iris.iloc[:, -1]


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

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.25)
clf = svm.SVC(kernel='rbf')
clf.fit(X_train, y_train)

y_pred = clf.predict(X_test)
print('Accuracy:', accuracy)
```

```
Accuracy: 1.0
```

[7]:
```
#SVM #LAB-4B
from sklearn.svm import SVC
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,␣
 ↪random_state=42)

clf = SVC(kernel='linear')

clf.fit(X_train, y_train)

predictions = clf.predict(X_test)
```

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accuracy = accuracy_score(y_test, predictions)
print("Accuracy:", accuracy)
```

```
Accuracy: 1.0
```

[10]:
```
#LAb-5 K Nearest Neighbour Algorithem

from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.datasets import load_iris
import numpy as np
import matplotlib.pyplot as plt
irisData = load_iris()

X = irisData.data
y = irisData.target

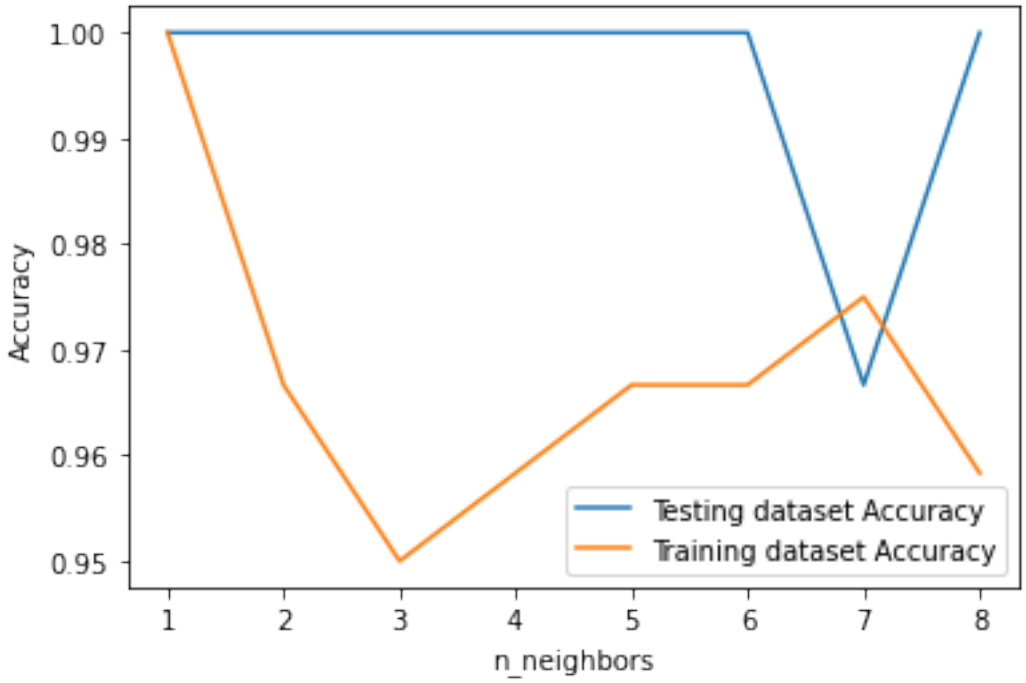
X_train, X_test, y_train, y_test = train_test_split(
X, y, test_size = 0.2, random_state=42)
neighbors = np.arange(1, 9)
train_accuracy = np.empty(len(neighbors))
test_accuracy = np.empty(len(neighbors))

for i, k in enumerate(neighbors):
    knn = KNeighborsClassifier(n_neighbors=k)
    knn.fit(X_train, y_train)

    train_accuracy[i] = knn.score(X_train, y_train)


    test_accuracy[i] = knn.score(X_test, y_test)

plt.plot(neighbors, test_accuracy, label = 'Testing dataset Accuracy')
plt.plot(neighbors, train_accuracy, label = 'Training dataset Accuracy')
plt.legend()
plt.xlabel('n_neighbors')
plt.ylabel('Accuracy')
plt.show()
```



[14]:
```
#Lab 6 Em algorithm
import numpy as np
import matplotlib.pyplot as plt
from sklearn.mixture import GaussianMixture
from scipy.stats import norm
import seaborn as sns

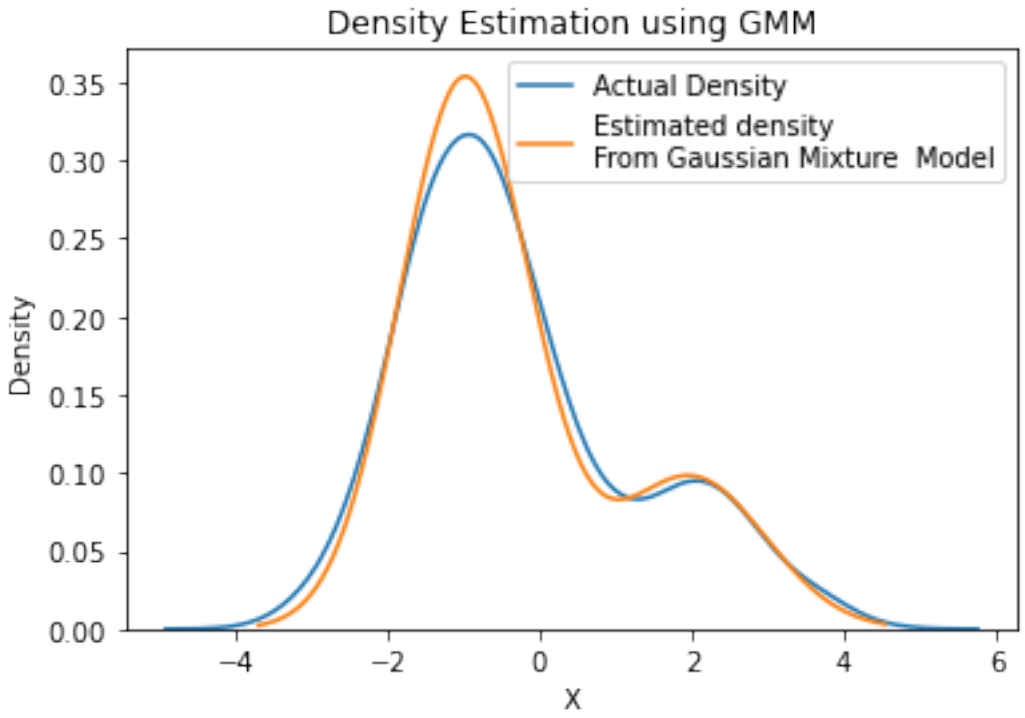
mu1, sigma1 = 2, 1
mu2, sigma2 = -1, 0.8
X1 = np.random.normal(mu1, sigma1, size=200)
X2 = np.random.normal(mu2, sigma2, size=600)
X = np.concatenate([X1, X2])
X = X.reshape(-1, 1)

gmm = GaussianMixture(n_components=2, random_state=0)
gmm.fit(X)

x_grid = np.linspace(min(X), max(X), 1000).reshape(-1, 1)
density_estimation = np.exp(gmm.score_samples(x_grid))
sns.kdeplot(X.ravel(), label="Actual Density")


plt.plot(x_grid, density_estimation, label='Estimated density\nFrom Gaussian␣
 ↪Mixture  Model')
```

```
plt.xlabel('X')
plt.ylabel('Density')
plt.title('Density Estimation using GMM')
plt.legend()
plt.show()
```



[21]:
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#Lab Program 7 the working of Naïve bayes classifier
from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import CategoricalNB
from sklearn.metrics import accuracy_score, classification_report
import pandas as pd

data = {'Feature1': [1, 2, 2, 1, 3, 3, 1, 2, 3, 3],
 'Feature2': ['A', 'B', 'B', 'A', 'C', 'C', 'A', 'B', 'C', 'C'],
 'Class': [0, 1, 1, 0, 1, 1, 0, 1, 1, 0]}

df = pd.DataFrame(data)
df_encoded = pd.get_dummies(df, columns=['Feature2'])
X_train, X_test, y_train, y_test = train_test_split(df_encoded.drop('Class',␣
 ↪axis=1), df['Class'],
                                                    test_size=0.2,␣
 ↪random_state=42)
```
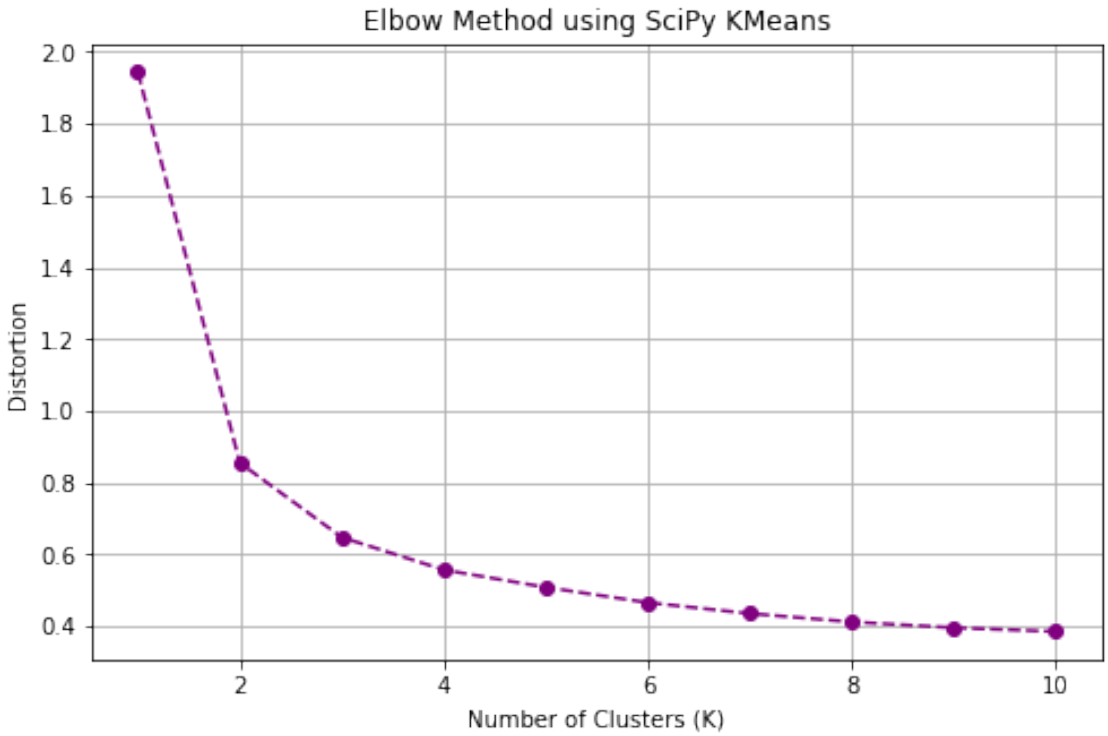
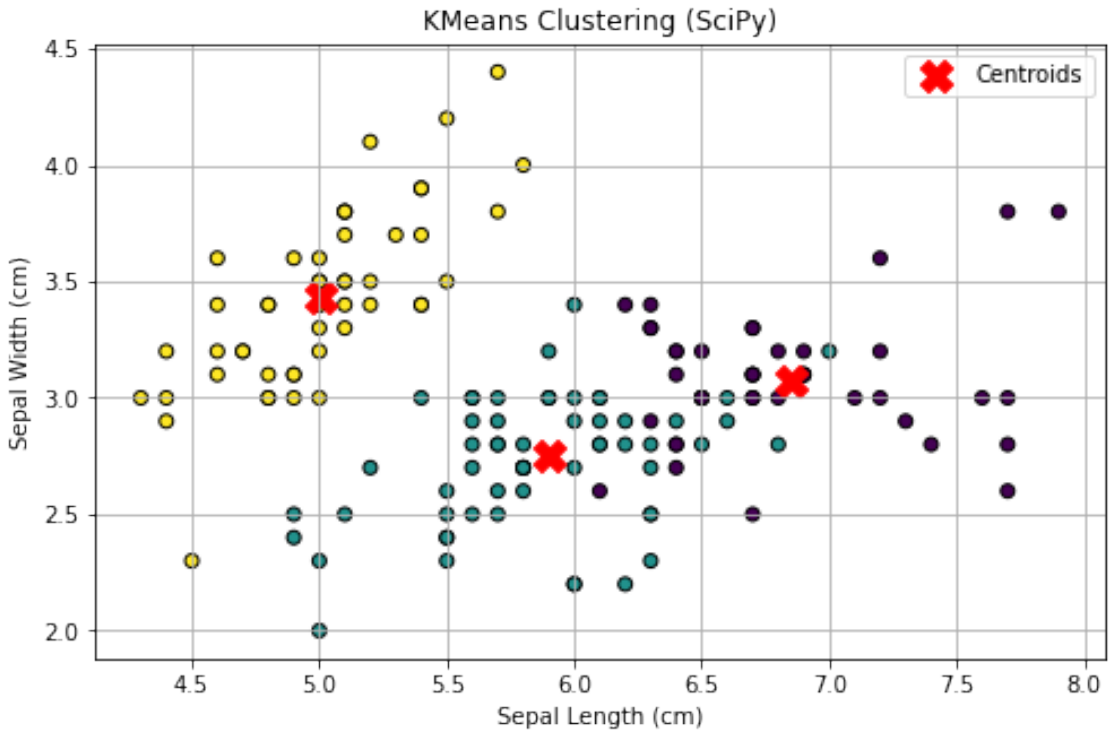

```
nb_classifier = CategoricalNB()
nb_classifier.fit(X_train, y_train)
y_pred = nb_classifier.predict(X_test)
accuracy = accuracy_score(y_test, y_pred)

print(f'Accuracy: {accuracy:.2f}')
print('Classification Report:')
print(classification_report(y_test, y_pred))
```

```
Accuracy: 1.00
Classification Report:
              precision    recall  f1-score   support

           1       1.00      1.00      1.00         2

    accuracy                           1.00         2
   macro avg       1.00      1.00      1.00         2
weighted avg       1.00      1.00      1.00         2
```

[4]:
```
# Lab Program 8  k-Means algorithm


%matplotlib inline

import os
os.environ['OMP_NUM_THREADS'] = '1'

import numpy as np
import matplotlib.pyplot as plt
from scipy.cluster.vq import kmeans, vq
from sklearn import datasets


iris = datasets.load_iris()
X = iris.data


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

for k in K_range:
    centroids, distortion = kmeans(X.astype(float), k)
    distortions.append(distortion)


plt.figure(figsize=(8, 5))
```

```
plt.plot(K_range, distortions, marker='o', linestyle='--', color='purple')
plt.title('Elbow Method using SciPy KMeans')
plt.xlabel('Number of Clusters (K)')
plt.ylabel('Distortion')
plt.grid(True)
plt.show()


centroids, _ = kmeans(X.astype(float), 3)
idx, _ = vq(X, centroids)


plt.figure(figsize=(8, 5))
plt.scatter(X[:, 0], X[:, 1], c=idx, cmap='viridis', edgecolors='k')
plt.scatter(centroids[:, 0], centroids[:, 1], c='red', marker='X', s=200,␣
 ↪label='Centroids')
plt.title('KMeans Clustering (SciPy)')
plt.xlabel('Sepal Length (cm)')
plt.ylabel('Sepal Width (cm)')
plt.legend()
plt.grid(True)
plt.show()
```




KMeans Clustering (SciPy)
Centroids
Sepal Width (cm)
Sepal Length (cm)
4.5
4.0
3.5
3.0
2.5
2.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0

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