KNN

from sklearn import datasets,preprocessing,neighbors

from sklearn.datasets import load\_iris

import numpy as np

from sklearn.model\_selection import train\_test\_split

from sklearn.metrics import accuracy\_score

import matplotlib.pyplot as plt

from sklearn.metrics import classification\_report,confusion\_matrix

iris=datasets.load\_iris()

print("iris data")

print(iris)

print("\n")

print("iris.feature\_names")

print("\n")

print(iris.feature\_names)

print("\n")

print("integers representing features(0=setosa,1=versicolor,2=virginica)")

print("\n")

print(iris.target)

print("\n")

print("3 classes of target")

print("\n")

print(iris.target\_names)

print("\n")

print("total of 150 observation and 4 features")

print("\n")

print(iris.data.shape)

print("\n")

x,y=iris.data[:,:],iris.target

x\_train,x\_test,y\_train,y\_test=train\_test\_split(x,y,stratify=y,random\_state=0,train\_size=0.7)

print("shape of train and test objects")

print("\n")

print(x\_train.shape)

print(x\_test.shape)

print("\n")

print("shape of train and test objects")

print("\n")

print(x\_train.shape)

print(x\_test.shape)

print("\n")

print("shape of new y objects")

print("\n")

print(y\_train)

print("\n")

print(y\_test)

print("\n")

print(y\_train.shape)

print(y\_test.shape)

print("\n")

print("training data before preprocessing")

print(x\_train)

print("\n")

scaler=preprocessing.StandardScaler().fit(x\_train)

x\_train=scaler.transform(x\_train)

print("display scaled data")

print("\n")

print(x\_train)

print("\n")

x\_test=scaler.transform(x\_test)

scores=[]

k\_range=range(1,15)

for k in k\_range:

knn=neighbors.KNeighborsClassifier(n\_neighbors=k)

knn.fit(x\_train,y\_train)

y\_pred=knn.predict(x\_test)

print("prediction of species;{}".format(y\_pred))

print("Accuracy score")

print(accuracy\_score(y\_test,y\_pred))

print("confusion matrix")

print(confusion\_matrix(y\_test,y\_pred))

print(classification\_report(y\_test,y\_pred))

OUTPUT

(105, 4)

(45, 4)

shape of train and test objects

(105, 4)

(45, 4)

shape of new y objects

[2 2 2 0 0 0 1 2 1 2 0 1 1 1 0 0 2 1 1 2 2 1 0 0 1 1 0 1 2 2 2 1 2 2 0 0 0

1 0 0 2 1 2 0 0 0 1 1 0 1 1 1 2 0 1 1 1 1 2 0 1 2 1 1 2 1 2 0 1 2 2 2 2 0

2 0 0 2 1 0 0 0 0 0 1 2 2 2 0 2 0 0 1 1 1 1 0 2 2 0 2 1 0 2 2]

[2 2 0 0 1 0 1 2 0 1 0 2 0 2 1 2 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

(105,)

(45,)

training data before preprocessing

[[6.7 3.3 5.7 2.5]

[7.7 3.8 6.7 2.2]

[6.4 3.2 5.3 2.3]

[4.6 3.6 1. 0.2]

[5.2 3.4 1.4 0.2]

[4.4 3. 1.3 0.2]

[4.9 2.4 3.3 1. ]

[6.4 2.7 5.3 1.9]

[6.1 3. 4.6 1.4]

[6.8 3. 5.5 2.1]

[4.8 3. 1.4 0.3]

[6.3 3.3 4.7 1.6]

[5.1 2.5 3. 1.1]

[6.6 2.9 4.6 1.3]

[4.9 3. 1.4 0.2]

[5. 3.4 1.5 0.2]

[7.7 3. 6.1 2.3]

[5.6 2.5 3.9 1.1]

[5.5 2.4 3.8 1.1]

[6. 2.2 5. 1.5]

[7.9 3.8 6.4 2. ]

[5.7 2.9 4.2 1.3]

[5. 3.6 1.4 0.2]

[5.4 3.4 1.5 0.4]

[5. 2.3 3.3 1. ]

[5.8 2.7 3.9 1.2]

[5.4 3.9 1.7 0.4]

[6.1 2.9 4.7 1.4]

[6.4 3.1 5.5 1.8]

[6.8 3.2 5.9 2.3]

[6.7 3.1 5.6 2.4]

[6. 2.7 5.1 1.6]

[6.2 2.8 4.8 1.8]

[6.4 2.8 5.6 2.2]

[4.4 2.9 1.4 0.2]

[5.4 3.7 1.5 0.2]

[4.3 3. 1.1 0.1]

[6.1 2.8 4.7 1.2]

[5.5 4.2 1.4 0.2]

[5.7 4.4 1.5 0.4]

[7.4 2.8 6.1 1.9]

[6. 2.2 4. 1. ]

[6. 3. 4.8 1.8]

[5.4 3.9 1.3 0.4]

[5.2 3.5 1.5 0.2]

[5.2 4.1 1.5 0.1]

[6.9 3.1 4.9 1.5]

[6.6 3. 4.4 1.4]

[5. 3.4 1.6 0.4]

[5.7 3. 4.2 1.2]

[5.7 2.6 3.5 1. ]

[5. 2. 3.5 1. ]

[6.7 2.5 5.8 1.8]

[4.5 2.3 1.3 0.3]

[6.8 2.8 4.8 1.4]

[6.7 3. 5. 1.7]

[6.3 2.3 4.4 1.3]

[6.1 2.8 4. 1.3]

[6.2 3.4 5.4 2.3]

[4.8 3.4 1.6 0.2]

[6.4 2.9 4.3 1.3]

[6.3 2.5 5. 1.9]

[5.4 3. 4.5 1.5]

[5.6 3. 4.5 1.5]

[6.4 2.8 5.6 2.1]

[5.6 2.7 4.2 1.3]

[7.7 2.6 6.9 2.3]

[5.3 3.7 1.5 0.2]

[5.2 2.7 3.9 1.4]

[7.2 3.2 6. 1.8]

[4.9 2.5 4.5 1.7]

[6.7 3.3 5.7 2.1]

[6.7 3. 5.2 2.3]

[5.1 3.5 1.4 0.3]

[7.3 2.9 6.3 1.8]

[5. 3.5 1.3 0.3]

[5. 3.3 1.4 0.2]

[6.5 3. 5.8 2.2]

[6.2 2.9 4.3 1.3]

[5.4 3.4 1.7 0.2]

[4.8 3.1 1.6 0.2]

[5. 3. 1.6 0.2]

[4.4 3.2 1.3 0.2]

[5.8 4. 1.2 0.2]

[5.8 2.6 4. 1.2]

[7.6 3. 6.6 2.1]

[7.7 2.8 6.7 2. ]

[6.5 3. 5.5 1.8]

[5. 3.2 1.2 0.2]

[5.8 2.7 5.1 1.9]

[4.7 3.2 1.3 0.2]

[5.7 3.8 1.7 0.3]

[5.9 3.2 4.8 1.8]

[5.6 2.9 3.6 1.3]

[6.3 2.5 4.9 1.5]

[5.5 2.3 4. 1.3]

[5. 3.5 1.6 0.6]

[5.8 2.8 5.1 2.4]

[6.3 2.8 5.1 1.5]

[4.7 3.2 1.6 0.2]

[6.1 3. 4.9 1.8]

[6. 2.9 4.5 1.5]

[4.9 3.1 1.5 0.2]

[6.9 3.2 5.7 2.3]

[6.9 3.1 5.1 2.3]]

display scaled data

[[ 9.75431527e-01 5.69896463e-01 1.08080020e+00 1.70475496e+00]

[ 2.14194987e+00 1.67393943e+00 1.63709442e+00 1.31106155e+00]

[ 6.25476025e-01 3.49087870e-01 8.58282512e-01 1.44229269e+00]

[-1.47425699e+00 1.23232224e+00 -1.53378264e+00 -1.31356119e+00]

[-7.74345984e-01 7.90705055e-01 -1.31126495e+00 -1.31356119e+00]

[-1.70756066e+00 -9.25293150e-02 -1.36689437e+00 -1.31356119e+00]

[-1.12430149e+00 -1.41738087e+00 -2.54305930e-01 -2.63712094e-01]

[ 6.25476025e-01 -7.54955092e-01 8.58282512e-01 9.17368138e-01]

[ 2.75520522e-01 -9.25293150e-02 4.68876558e-01 2.61212453e-01]

[ 1.09208336e+00 -9.25293150e-02 9.69541356e-01 1.17983041e+00]

[-1.24095332e+00 -9.25293150e-02 -1.31126495e+00 -1.18233005e+00]

[ 5.08824191e-01 5.69896463e-01 5.24505980e-01 5.23674727e-01]

[-8.90997819e-01 -1.19657228e+00 -4.21194196e-01 -1.32480957e-01]

[ 8.58779693e-01 -3.13337907e-01 4.68876558e-01 1.29981317e-01]

[-1.12430149e+00 -9.25293150e-02 -1.31126495e+00 -1.31356119e+00]

[-1.00764965e+00 7.90705055e-01 -1.25563553e+00 -1.31356119e+00]

[ 2.14194987e+00 -9.25293150e-02 1.30331789e+00 1.44229269e+00]

[-3.07738648e-01 -1.19657228e+00 7.94706030e-02 -1.32480957e-01]

[-4.24390482e-01 -1.41738087e+00 2.38411809e-02 -1.32480957e-01]

[ 1.58868688e-01 -1.85899805e+00 6.91394246e-01 3.92443590e-01]

[ 2.37525354e+00 1.67393943e+00 1.47020616e+00 1.04859927e+00]

[-1.91086814e-01 -3.13337907e-01 2.46358869e-01 1.29981317e-01]

[-1.00764965e+00 1.23232224e+00 -1.31126495e+00 -1.31356119e+00]

[-5.41042316e-01 7.90705055e-01 -1.25563553e+00 -1.05109892e+00]

[-1.00764965e+00 -1.63818946e+00 -2.54305930e-01 -2.63712094e-01]

[-7.44349799e-02 -7.54955092e-01 7.94706030e-02 -1.24982035e-03]

[-5.41042316e-01 1.89474802e+00 -1.14437668e+00 -1.05109892e+00]

[ 2.75520522e-01 -3.13337907e-01 5.24505980e-01 2.61212453e-01]

[ 6.25476025e-01 1.28279278e-01 9.69541356e-01 7.86137001e-01]

[ 1.09208336e+00 3.49087870e-01 1.19205904e+00 1.44229269e+00]

[ 9.75431527e-01 1.28279278e-01 1.02517078e+00 1.57352382e+00]

[ 1.58868688e-01 -7.54955092e-01 7.47023668e-01 5.23674727e-01]

[ 3.92172357e-01 -5.34146500e-01 5.80135402e-01 7.86137001e-01]

[ 6.25476025e-01 -5.34146500e-01 1.02517078e+00 1.31106155e+00]

[-1.70756066e+00 -3.13337907e-01 -1.31126495e+00 -1.31356119e+00]

[-5.41042316e-01 1.45313083e+00 -1.25563553e+00 -1.31356119e+00]

[-1.82421249e+00 -9.25293150e-02 -1.47815322e+00 -1.44479233e+00]

[ 2.75520522e-01 -5.34146500e-01 5.24505980e-01 -1.24982035e-03]

[-4.24390482e-01 2.55717380e+00 -1.31126495e+00 -1.31356119e+00]

[-1.91086814e-01 2.99879098e+00 -1.25563553e+00 -1.05109892e+00]

[ 1.79199437e+00 -5.34146500e-01 1.30331789e+00 9.17368138e-01]

[ 1.58868688e-01 -1.85899805e+00 1.35100025e-01 -2.63712094e-01]

[ 1.58868688e-01 -9.25293150e-02 5.80135402e-01 7.86137001e-01]

[-5.41042316e-01 1.89474802e+00 -1.36689437e+00 -1.05109892e+00]

[-7.74345984e-01 1.01151365e+00 -1.25563553e+00 -1.31356119e+00]

[-7.74345984e-01 2.33636520e+00 -1.25563553e+00 -1.44479233e+00]

[ 1.20873520e+00 1.28279278e-01 6.35764824e-01 3.92443590e-01]

[ 8.58779693e-01 -9.25293150e-02 3.57617713e-01 2.61212453e-01]

[-1.00764965e+00 7.90705055e-01 -1.20000611e+00 -1.05109892e+00]

[-1.91086814e-01 -9.25293150e-02 2.46358869e-01 -1.24982035e-03]

[-1.91086814e-01 -9.75763685e-01 -1.43047085e-01 -2.63712094e-01]

[-1.00764965e+00 -2.30061524e+00 -1.43047085e-01 -2.63712094e-01]

[ 9.75431527e-01 -1.19657228e+00 1.13642962e+00 7.86137001e-01]

[-1.59090882e+00 -1.63818946e+00 -1.36689437e+00 -1.18233005e+00]

[ 1.09208336e+00 -5.34146500e-01 5.80135402e-01 2.61212453e-01]

[ 9.75431527e-01 -9.25293150e-02 6.91394246e-01 6.54905864e-01]

[ 5.08824191e-01 -1.63818946e+00 3.57617713e-01 1.29981317e-01]

[ 2.75520522e-01 -5.34146500e-01 1.35100025e-01 1.29981317e-01]

[ 3.92172357e-01 7.90705055e-01 9.13911934e-01 1.44229269e+00]

[-1.24095332e+00 7.90705055e-01 -1.20000611e+00 -1.31356119e+00]

[ 6.25476025e-01 -3.13337907e-01 3.01988291e-01 1.29981317e-01]

[ 5.08824191e-01 -1.19657228e+00 6.91394246e-01 9.17368138e-01]

[-5.41042316e-01 -9.25293150e-02 4.13247136e-01 3.92443590e-01]

[-3.07738648e-01 -9.25293150e-02 4.13247136e-01 3.92443590e-01]

[ 6.25476025e-01 -5.34146500e-01 1.02517078e+00 1.17983041e+00]

[-3.07738648e-01 -7.54955092e-01 2.46358869e-01 1.29981317e-01]

[ 2.14194987e+00 -9.75763685e-01 1.74835327e+00 1.44229269e+00]

[-6.57694150e-01 1.45313083e+00 -1.25563553e+00 -1.31356119e+00]

[-7.74345984e-01 -7.54955092e-01 7.94706030e-02 2.61212453e-01]

[ 1.55869070e+00 3.49087870e-01 1.24768847e+00 7.86137001e-01]

[-1.12430149e+00 -1.19657228e+00 4.13247136e-01 6.54905864e-01]

[ 9.75431527e-01 5.69896463e-01 1.08080020e+00 1.17983041e+00]

[ 9.75431527e-01 -9.25293150e-02 8.02653090e-01 1.44229269e+00]

[-8.90997819e-01 1.01151365e+00 -1.31126495e+00 -1.18233005e+00]

[ 1.67534253e+00 -3.13337907e-01 1.41457673e+00 7.86137001e-01]

[-1.00764965e+00 1.01151365e+00 -1.36689437e+00 -1.18233005e+00]

[-1.00764965e+00 5.69896463e-01 -1.31126495e+00 -1.31356119e+00]

[ 7.42127859e-01 -9.25293150e-02 1.13642962e+00 1.31106155e+00]

[ 3.92172357e-01 -3.13337907e-01 3.01988291e-01 1.29981317e-01]

[-5.41042316e-01 7.90705055e-01 -1.14437668e+00 -1.31356119e+00]

[-1.24095332e+00 1.28279278e-01 -1.20000611e+00 -1.31356119e+00]

[-1.00764965e+00 -9.25293150e-02 -1.20000611e+00 -1.31356119e+00]

[-1.70756066e+00 3.49087870e-01 -1.36689437e+00 -1.31356119e+00]

[-7.44349799e-02 2.11555661e+00 -1.42252379e+00 -1.31356119e+00]

[-7.44349799e-02 -9.75763685e-01 1.35100025e-01 -1.24982035e-03]

[ 2.02529803e+00 -9.25293150e-02 1.58146500e+00 1.17983041e+00]

[ 2.14194987e+00 -5.34146500e-01 1.63709442e+00 1.04859927e+00]

[ 7.42127859e-01 -9.25293150e-02 9.69541356e-01 7.86137001e-01]

[-1.00764965e+00 3.49087870e-01 -1.42252379e+00 -1.31356119e+00]

[-7.44349799e-02 -7.54955092e-01 7.47023668e-01 9.17368138e-01]

[-1.35760516e+00 3.49087870e-01 -1.36689437e+00 -1.31356119e+00]

[-1.91086814e-01 1.67393943e+00 -1.14437668e+00 -1.18233005e+00]

[ 4.22168542e-02 3.49087870e-01 5.80135402e-01 7.86137001e-01]

[-3.07738648e-01 -3.13337907e-01 -8.74176633e-02 1.29981317e-01]

[ 5.08824191e-01 -1.19657228e+00 6.35764824e-01 3.92443590e-01]

[-4.24390482e-01 -1.63818946e+00 1.35100025e-01 1.29981317e-01]

[-1.00764965e+00 1.01151365e+00 -1.20000611e+00 -7.88636642e-01]

[-7.44349799e-02 -5.34146500e-01 7.47023668e-01 1.57352382e+00]

[ 5.08824191e-01 -5.34146500e-01 7.47023668e-01 3.92443590e-01]

[-1.35760516e+00 3.49087870e-01 -1.20000611e+00 -1.31356119e+00]

[ 2.75520522e-01 -9.25293150e-02 6.35764824e-01 7.86137001e-01]

[ 1.58868688e-01 -3.13337907e-01 4.13247136e-01 3.92443590e-01]

[-1.12430149e+00 1.28279278e-01 -1.25563553e+00 -1.31356119e+00]

[ 1.20873520e+00 3.49087870e-01 1.08080020e+00 1.44229269e+00]

[ 1.20873520e+00 1.28279278e-01 7.47023668e-01 1.44229269e+00]]

prediction of species;[2 2 0 0 1 0 1 2 0 1 0 2 0 2 1 1 2 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9555555555555556

confusion matrix

[[15 0 0]

[ 0 14 1]

[ 0 1 14]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.93 0.93 0.93 15

2 0.93 0.93 0.93 15

accuracy 0.96 45

macro avg 0.96 0.96 0.96 45

weighted avg 0.96 0.96 0.96 45

prediction of species;[2 1 0 0 1 0 1 2 0 1 0 2 0 2 1 1 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9555555555555556

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 2 13]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.88 1.00 0.94 15

2 1.00 0.87 0.93 15

accuracy 0.96 45

macro avg 0.96 0.96 0.96 45

weighted avg 0.96 0.96 0.96 45

prediction of species;[2 2 0 0 1 0 1 2 0 1 0 2 0 2 1 1 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9777777777777777

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 1 14]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.94 1.00 0.97 15

2 1.00 0.93 0.97 15

accuracy 0.98 45

macro avg 0.98 0.98 0.98 45

weighted avg 0.98 0.98 0.98 45

prediction of species;[2 2 0 0 1 0 1 1 0 1 0 2 0 2 1 1 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9555555555555556

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 2 13]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.88 1.00 0.94 15

2 1.00 0.87 0.93 15

accuracy 0.96 45

macro avg 0.96 0.96 0.96 45

weighted avg 0.96 0.96 0.96 45

prediction of species;[2 2 0 0 1 0 1 2 0 1 0 2 0 2 1 1 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9777777777777777

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 1 14]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.94 1.00 0.97 15

2 1.00 0.93 0.97 15

accuracy 0.98 45

macro avg 0.98 0.98 0.98 45

weighted avg 0.98 0.98 0.98 45

prediction of species;[2 2 0 0 1 0 1 1 0 1 0 2 0 2 1 1 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9555555555555556

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 2 13]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.88 1.00 0.94 15

2 1.00 0.87 0.93 15

accuracy 0.96 45

macro avg 0.96 0.96 0.96 45

weighted avg 0.96 0.96 0.96 45

prediction of species;[2 2 0 0 1 0 1 1 0 1 0 2 0 2 1 2 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9777777777777777

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 1 14]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.94 1.00 0.97 15

2 1.00 0.93 0.97 15

accuracy 0.98 45

macro avg 0.98 0.98 0.98 45

weighted avg 0.98 0.98 0.98 45

prediction of species;[2 2 0 0 1 0 1 1 0 1 0 2 0 2 1 2 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9777777777777777

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 1 14]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.94 1.00 0.97 15

2 1.00 0.93 0.97 15

accuracy 0.98 45

macro avg 0.98 0.98 0.98 45

weighted avg 0.98 0.98 0.98 45

prediction of species;[2 2 0 0 1 0 1 1 0 1 0 2 0 2 1 2 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9777777777777777

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 1 14]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.94 1.00 0.97 15

2 1.00 0.93 0.97 15

accuracy 0.98 45

macro avg 0.98 0.98 0.98 45

weighted avg 0.98 0.98 0.98 45

prediction of species;[2 2 0 0 1 0 1 1 0 1 0 2 0 2 1 2 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 1 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9555555555555556

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 2 13]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.88 1.00 0.94 15

2 1.00 0.87 0.93 15

accuracy 0.96 45

macro avg 0.96 0.96 0.96 45

weighted avg 0.96 0.96 0.96 45

prediction of species;[2 2 0 0 1 0 1 1 0 1 0 2 0 2 1 2 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9777777777777777

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 1 14]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.94 1.00 0.97 15

2 1.00 0.93 0.97 15

accuracy 0.98 45

macro avg 0.98 0.98 0.98 45

weighted avg 0.98 0.98 0.98 45

prediction of species;[2 2 0 0 1 0 1 1 0 1 0 2 0 2 1 2 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 1 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9555555555555556

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 2 13]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.88 1.00 0.94 15

2 1.00 0.87 0.93 15

accuracy 0.96 45

macro avg 0.96 0.96 0.96 45

weighted avg 0.96 0.96 0.96 45

prediction of species;[2 2 0 0 1 0 1 2 0 1 0 2 0 2 1 2 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 2 1

0 0 1 0 2 0 0 2]

Accuracy score

1.0

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 0 15]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 1.00 1.00 1.00 15

2 1.00 1.00 1.00 15

accuracy 1.00 45

macro avg 1.00 1.00 1.00 45

weighted avg 1.00 1.00 1.00 45

prediction of species;[2 2 0 0 1 0 1 1 0 1 0 2 0 2 1 1 1 1 1 0 1 2 0 1 2 2 2 2 1 2 1 0 0 1 1 1 1

0 0 1 0 2 0 0 2]

Accuracy score

0.9333333333333333

confusion matrix

[[15 0 0]

[ 0 15 0]

[ 0 3 12]]

precision recall f1-score support

0 1.00 1.00 1.00 15

1 0.83 1.00 0.91 15

2 1.00 0.80 0.89 15

accuracy 0.93 45

macro avg 0.94 0.93 0.93 45

weighted avg 0.94 0.93 0.93 45