LAB EXERCISE – 9

SUPPORT VECTOR MACHINES

Aim of the Experiment

The main aim of this experiment is to implement support vector machine for the Iris dataset. he objectives of this experiment are

1. Implement SVM for Iris Dataset
2. Find confusion matrix and evaluation metrics for SVM

SVM model can be constructed using sklearn command,

```
model = SVC(kernel='linear',random_state=0)
```

Similarly, by changing the flag ‘linear’ with ‘rbf’, one can construct the Gaussian RBF kernel also.

model.fit and model.predict can be used to fit the data and to make prediction.

Program Listing - 1

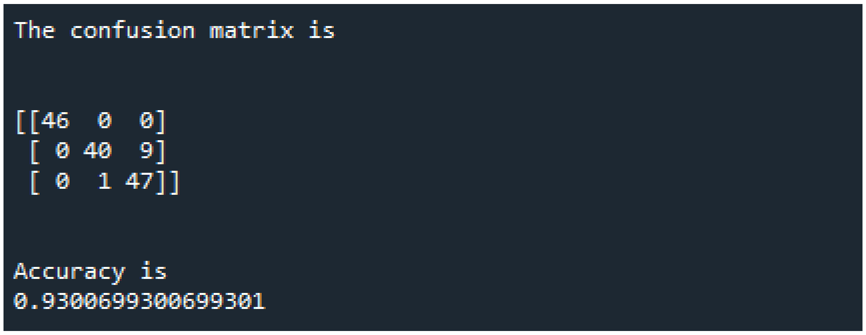
```
import pandas as pd

from sklearn.svm import SVC

from sklearn.model_selection import train_test_split

from sklearn.metrics import confusion_matrix

from sklearn.metrics import classification_report

from sklearn.metrics import accuracy_score



# Reading the csv Iris dataset file


df = pd.read_csv("iris1.csv")

print(df.head(10))


# Conditioning the data


array = df.values
```

```
X = array[:,0:4]
y = array[:,4]

# Condition the training and Testing data
# The number of samples can be tuned with the test_size parameter.
# Here, 95% of the data is used.

X_train, X_test, y_train, y_test = train_test_split( \
   X, y,test_size=0.95,random_state=0)

# Construct the Linear model

model = SVC(kernel='linear',random_state=0)
model.fit(X_train,y_train)

# Test the model with Linear kernel

pred = model.predict(X_test)

# Prepare confusion matrix
print("\n\nThe confusion matrix is \n\n")
conf = confusion_matrix(y_test,pred)
print(conf)

# pepare Classification Report

print("\n\nAccuracy is")
accuracy = accuracy_score(y_test,pred)
print(accuracy)
```

```
# Or report can be obtained as follows
print('\n Classification Report')
report = classification_report(y_test,pred)
print(report)

# RBF kernel
model1 = SVC(kernel='rbf',random_state=0)
model1.fit(X_train,y_train)

# Test the model

pred = model1.predict(X_test)

# Prepare confusion matrix
print("\n\nThe confusion matrix for RBF kernel is \n\n")
conf = confusion_matrix(y_test,pred)
print(conf)

# pepare Classification Report

print("\n\nAccuracy for RBF kernel is")
accuracy = accuracy_score(y_test,pred)
print(accuracy)
```

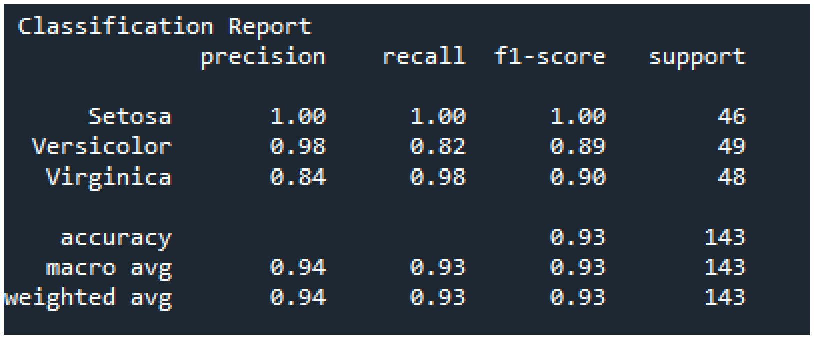
Output

The following screenshot shows the confusion matrix of SVM with linear kernel.



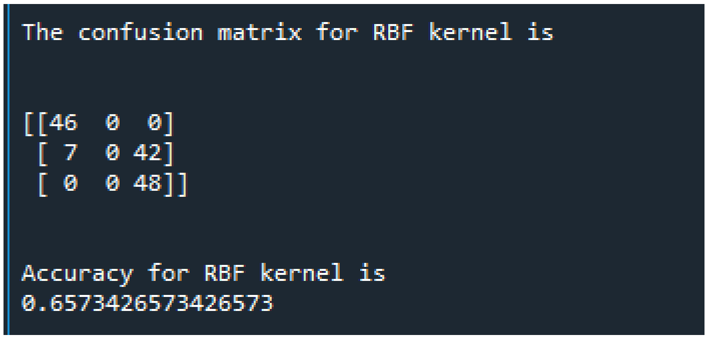
```
The confusion matrix is


[[46  0  0]
 [ 0 40  9]
 [ 0  1 47]]


Accuracy is
0.9300699300699301
```

The following screenshot shows the classification report of SVM with linear kernel.



```
Classification Report
              precision    recall  f1-score   support

      Setosa       1.00      1.00      1.00        46
  Versicolor       0.98      0.82      0.89        49
   Virginica       0.84      0.98      0.90        48

    accuracy                           0.93       143
   macro avg       0.94      0.93      0.93       143
weighted avg       0.94      0.93      0.93       143
```

The following screenshot shows the confusion matrix of SVM with Gaussian RBF kernel.



```
The confusion matrix for RBF kernel is


[[46  0  0]
 [ 7  0 42]
 [ 0  0 48]]


Accuracy for RBF kernel is
0.6573426573426573
```