Abhiroop Goel

3067979

EECS 658

Assignment 2 Calculations for task 6

1. Accuracy = $\frac{sum\ of\ diagonals}{total\ samples}$

   = (50 + 47+47) / 50

   = 0.96

2. Precision = $\frac{TP}{TP+FP}$

   A. Iris Setosa ~>

   TP = 50
   FP = 0
   P(IrisSetosa) = 50 / 50+ 0
   = 1

   B. Iris Versicolor ~> TP = 47
   FP = 3
   P (IrisVersicolor) = 47 / 47+3
   = 0.94

   C. Iris Virginica ~> TP = 47
   FP = 3
   P(IrisVirginica) = 47 / 47+3
   = 0.94

3. Recall = $\frac{TP}{TP+FN}$

A. Iris Setosa ~ > TP = 50
FN=0
R(IrisSetosa)= 50 / 50 + 0
= 1

B. Iris Versicolor ~> TP = 47
FN = 3
P (IrisVersicolor) = 47 / 47+3
= 0.94

C. Iris Virginica ~> TP = 47
FN = 3
P(IrisVirginica) = 47 / 47+3
= 0.94

4. F1 Score = $\frac{2 .P.R}{P+R}$

A. Iris Setosa ~> P = 1
R=1

$$F1(Iris\ Setosa) = \frac{2 * 1.00 * 1.00}{1.00 + 1.00}$$

$$= 1.00$$

B. Iris Versicolor ~> P=0.94

R=0.94

F1(Iris Versicolor)= $\frac{2*0.94*0.94}{0.94+.094}$

$= 0.94$

C. Iris Virginica ~ > P=0.94

R=0.94

F1(Iris Versicolor)= $\frac{2*0.94*0.94}{0.94+.094}$

$= 0.94$

Screen Shots of task 1 and 2

```
@AbhiroopGoel →/workspaces/eecs-658-HW-1 (main) $ pip install numpy pandas scipy scikit-learn
Collecting numpy
  Downloading numpy-2.4.1-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_x86_64.whl.metadata (6.6 kB)
Collecting pandas
  Downloading pandas-3.0.0-cp312-cp312-manylinux_2_24_x86_64.manylinux_2_28_x86_64.whl.metadata (79 kB)
Collecting scipy
  Downloading scipy-1.17.0-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_x86_64.whl.metadata (62 kB)
Collecting scikit-learn
  Downloading scikit_learn-1.8.0-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_x86_64.whl.metadata (11 kB)
Requirement already satisfied: python-dateutil>=2.8.2 in /home/codespace/.local/lib/python3.12/site-packages (from pandas) (2.9.0.post0)
Collecting joblib>=1.3.0 (from scikit-learn)
  Downloading joblib-1.5.3-py3-none-any.whl.metadata (5.5 kB)
Collecting threadpoolctl>=3.2.0 (from scikit-learn)
  Downloading threadpoolctl-3.6.0-py3-none-any.whl.metadata (13 kB)
Requirement already satisfied: six>=1.5 in /home/codespace/.local/lib/python3.12/site-packages (from python-dateutil>=2.8.2->pandas) (1.17.0)
Downloading numpy-2.4.1-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_x86_64.whl (16.4 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 16.4/16.4 MB 29.0 MB/s  0:00:00
Downloading pandas-3.0.0-cp312-cp312-manylinux_2_24_x86_64.manylinux_2_28_x86_64.whl (10.9 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 10.9/10.9 MB 46.7 MB/s  0:00:00
Downloading scipy-1.17.0-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_x86_64.whl (35.0 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 35.0/35.0 MB 50.1 MB/s  0:00:00
Downloading scikit_learn-1.8.0-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_x86_64.whl (8.9 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 8.9/8.9 MB 46.4 MB/s  0:00:00
Downloading joblib-1.5.3-py3-none-any.whl (309 kB)
Downloading threadpoolctl-3.6.0-py3-none-any.whl (18 kB)
Installing collected packages: threadpoolctl, numpy, joblib, scipy, pandas, scikit-learn
Successfully installed joblib-1.5.3 numpy-2.4.1 pandas-3.0.0 scikit-learn-1.8.0 scipy-1.17.0 threadpoolctl-3.6.0
@AbhiroopGoel →/workspaces/eecs-658-HW-1 (main) $ python3 CheckVersions.py
Python: 3.12.1 (main, Nov 27 2025, 10:47:52) [GCC 13.3.0]
scipy: 1.17.0
numpy: 2.4.1
pandas: 3.0.0
sklearn: 1.8.0
Hello World!
```

Fig: Task 1 displaying all the required libraries/modules are up and running along with version numbers

```
@AbhiroopGoel →/workspaces/eecs-658-HW-1 (main) $ python3 NBClassifier.py
Accuracy: 0.96

Confusion Matrix:
 [[50  0  0]
 [ 0 47  3]
 [ 0  3 47]]

Classification Report:
                precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        50
Iris-versicolor       0.94      0.94      0.94        50
 Iris-virginica       0.94      0.94      0.94        50

       accuracy                           0.96       150
      macro avg       0.96      0.96      0.96       150
   weighted avg       0.96      0.96      0.96       150
```

Fig: Task 2 displaying functionality of NBClassifier.py program, displaying all the required fields in the SS.