Ex. No. 3 MULTI CLASS CLASSIFICATION

Date:

Aim:

To write a python program to implement the multi class classification algorithm.

Equipments Required:

1. Hardware – PCs
2. Anaconda – Python 3.7 Installation / Moodle-Code Runner / Google Colab

Concept:

- In Multi Class Classification, multiple class labels are present in the dataset.
- The number of classifier models depends on the classification technique we are applying to.
- One vs. All: N-class instances then N binary classifier models.
- One vs. One: N-class instances then N* (N 1)/2 binary classifier models.
- The Confusion matrix is easy to derive but complex to understand.
- Example: Check whether the fruit is apple, banana, or orange.

Popular algorithms that can be used for multi-class classification include: k-

Nearest Neighbors.
Decision Trees.
Naive Bayes.
Random Forest.
Gradient Boosting.

Libraries Used in the program:

NUMPY

NumPy is a library for the Python programming language, adding support for large, multidimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays.

SKLEARN

Scikit-learn is a free software machine learning library for the Python programming language. It features various classification, regression and clustering algorithms including support-vector machines.

MATPLOTLIB

Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general purpose GUI toolkits like Tkinter, wxPython, Qt, or GTK

Counter

Counter tool to easily count words in a document or two. It also works well with pandas data frames, allowing us to make simple comparisons.

Algorithm:

1. Start the program.
2. Import libraries required as per requirement.
3. Define dataset use the make_blobs() function to generate a synthetic multi -class classification dataset.
4. summarize dataset shape.
5. summarize observations by class label.
6. summarize first few examples.
7. plot the dataset and color the by class label.
8. stop the program

Program:

/*

Program to implement the multi class classification.

Developed by: BHARTH RAJ V

Register Number: 212219040015

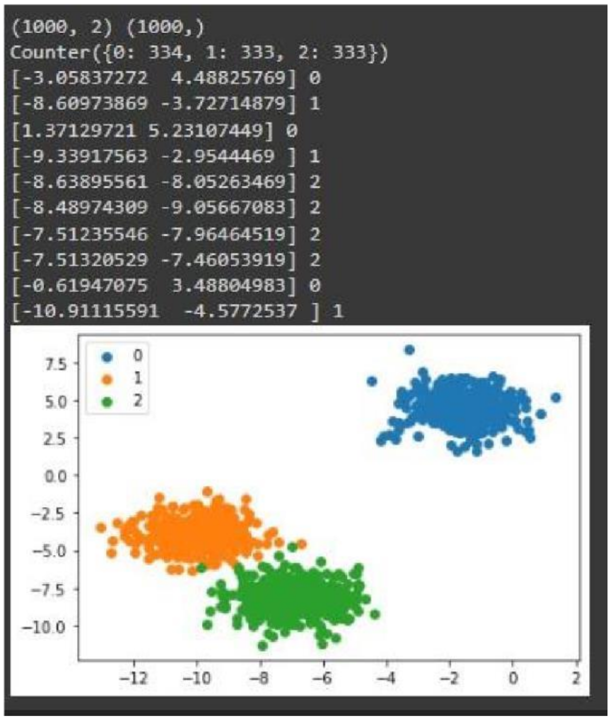
*/

```
from numpy import where
from collections import Counter
from sklearn.datasets import make_blobs
from matplotlib import pyplot
# define dataset--- use the make_blobs() function to generate a synthetic multi-class
classification dataset.
X, y = make_blobs(n_samples=1000, centers=3, random_state=1) #
 summarize dataset shape print(X.shape, y.shape)
```

```
# summarize observations by class label
counter = Counter(y) print(counter) #
summarize first few examples for i in
range(10):
        print(X[i], y[i])

# plot the dataset and color the by class label for
label, _ in counter.items():
        row_ix = where(y == label)[0]
        pyplot.scatter(X[row_ix, 0], X[row_ix, 1], label=str(label)) pyplot.legend()
pyplot.show()
```

Output:



```
(1000, 2) (1000,)
Counter({0: 334, 1: 333, 2: 333})
[-3.05837272  4.48825769] 0
[-8.60973869 -3.72714879] 1
[1.37129721 5.23107449] 0
[-9.33917563 -2.9544469 ] 1
[-8.63895561 -8.05263469] 2
[-8.48974309 -9.05667083] 2
[-7.51235546 -7.96464519] 2
[-7.51320529 -7.46053919] 2
[-0.61947075  3.48804983] 0
[-10.91115591  -4.5772537 ] 1
```

Result:

Thus the python program to implement the multi class classification was implemented successfully.