

5. Write a program to implement the naive Bayesian classifier for a sample training dataset stored as a .csv file. Compute the accuracy of the classifier, considering few test data set.

```
import csv, random, math
import statistics as st
def loadcsv(filename):
    lines = csv.reader(open(filename, "r"))
    dataset = list(lines)
    for i in range(len(dataset)):
        dataset[i] = [float(x) for x in dataset[i]]
    return dataset
```

```
def splitDataset(dataset, splitRatio):
    testSize = int(len(dataset) * splitRatio);
    trainSet = list(dataset);
    testSet = []
    while len(testSet) < testSize:
        index = random.randrange(len(trainSet));
        testSet.append(trainSet.pop(index))
    return [trainSet, testSet]
```

```
def separateByClass(dataset):
    separated = {}
    for i in range(len(dataset)):
        x = dataset[i]
        if (x[-1] not in separated):
```



```

        separated[x[-1]] = [ ]
        separated[x[-1]].append(x)
    return separated

```

```

def compute_mean_std(dataset):
    mean_std = [(st.mean(attribute), st.stdev(attribute))
                 for attribute in zip(*dataset)];
    del mean_std[-1]
    return mean_std

```

```

def SummarizeByClass(dataset):
    separated = separateByClass(dataset);
    summary = { }
    for classValue, instances in separated.items():
        summary[classValue] = compute_mean_std(instances)
    return summary

```

```

def estimateProbability(x, mean, stdev):
    exponent = math.exp(-(math.pow(x-mean, 2) /
                                   (2 * math.pow(stdev, 2))))
    return (1 / (math.sqrt(2 * math.pi) * stdev)) * exponent

```

```

def calculateClassProbabilities(summaries, testVector):
    p = { }
    for classValue, classSummaries in summaries.items():
        p[classValue] = 1
        for i in range(len(classSummaries)):
            mean, stdev = classSummaries[i]

```



```

x = testVector[i]
p[classValue] * = estimateProbability(x, mean,
                                       stdev);
return p

```

```

def predict(summarize, testVector):
    all_p = CalculateClassProbabilities(summarize, testVector)
    bestLabel, bestProb = None, -1
    for lbl, p in all_p.items():
        if bestLabel is None or p > bestProb:
            bestProb = p
            bestLabel = lbl
    return bestLabel

```

```

def perform_classification(summarize, testSet):
    predictions = []
    for i in range(len(testSet)):
        result = predict(summarize, testSet[i])
        predictions.append(result)
    return predictions

```

```

def getAccuracy(testSet, predictions):
    correct = 0
    for i in range(len(testSet)):
        if testSet[i][-1] == predictions[i]:
            correct += 1
    return (correct / float(len(testSet))) * 100.0

```



```

dataset = loadcsv('diabetes.csv');
print('Pima Indian Diabetes Dataset loaded....')
print('Total instances available: ', len(dataset))
print('Total attributes present: ', len(dataset[0]-1))
print("First Five instances of dataset: ")
for i in range(5):
    print(i+1, ': ', dataset[i])
splitRatio = 0.2
trainingSet, testSet = splitDataset(dataset, splitRatio)
print('Dataset is split into training and testing set')
print('Training examples = {0} In Testing examples = {1}'.
      format(len(trainingSet), len(testSet)))
summarizer = summarizeByClass(trainingSet);
predictions = perform_classification(summarizer, testSet)
accuracy = getAccuracy(testSet, predictions)
print('Accuracy of the Naive Bayesian classifier is: ',
      accuracy)

```


Output:-

Pima Indian Diabetes Dataset loaded.

Total instances available : 768

Total attributes present : 8

First Five instances of dataset:

1 : [6.0, 148.0, 72.0, 35.0, 0.0, 33.6, 0.627, 50.0, 1.0]

2 : [1.0, 85.0, 66.0, 29.0, 0.0, 26.6, 0.351, 31.0, 0.0]

3 : [8.0, 183.0, 64.0, 0.0, 0.0, 23.3, 0.672, 32.0, 1.0]

4 : [1.0, 89.0, 66.0, 23.0, 94.0, 28.1, 0.167, 21.0, 0.0]

5 : [0.0, 137.0, 40.0, 35.0, 168.0, 43.1, 2.288, 33.0, 1.0]

Dataset is split into training and testing set.

Training examples = 615

Testing examples = 153

Accuracy of the Naive Bayesian Classifier is : 75.16339869281046