VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.

LAB REPORT

on

COURSE TITLE

Submitted by

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in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING

(Autonomous Institution under VTU)

BENGALURU-560019

May-2022 to July-2022

B. M. S. College of Engineering,

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(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled “Machine Learning” carried out by **Matam Vijayeshjeevan (1BM19CS084),** who is bonafide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of a **Machine Learning -**
(20CS6PCMAL) work prescribed for the said degree.

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Index Sheet

Course Outcome

1.Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples.

In [1]:
```
import numpy as np
import pandas as pd
```

In [2]:
```
data = pd.read_csv("mydata.csv")
print(data,"\n")
```

```
      Time Weather Temperature Company Humidity    Wind Goes
0  Morning   Sunny        Warm     Yes     Mild  Strong  Yes
1  Evening   Rainy        Cold      No     Mild  Normal   No
2  Morning   Sunny    Moderate     Yes   Normal  Normal  Yes
3  Evening   Sunny        Cold     Yes     High  Strong  Yes
```

In [3]:
```
d = np.array(data)[:,:-1]
print("\n The attributes are: ",d)
target = np.array(data)[:,-1]
print("\n The target is: ",target)
```

```
The attributes are:  [['Morning' 'Sunny' 'Warm' 'Yes' 'Mild' 'Strong']
['Evening' 'Rainy' 'Cold' 'No' 'Mild' 'Normal']
['Morning' 'Sunny' 'Moderate' 'Yes' 'Normal' 'Normal']
['Evening' 'Sunny' 'Cold' 'Yes' 'High' 'Strong']]

The target is:  ['Yes' 'No' 'Yes' 'Yes']
```

In [4]:
```
def findS(c,t):
    for i, val in enumerate(t):
        if val == "Yes":
            specific_hypothesis = c[i].copy()
            break

    for i, val in enumerate(c):
        if t[i] == "Yes":
            for x in range(len(specific_hypothesis)):
                if val[x] != specific_hypothesis[x]:
                    specific_hypothesis[x] = '?'
                else:
                    pass

    return specific_hypothesis

print("\n The final hypothesis is:",findS(d,target))
```

```
The final hypothesis is: ['?' 'Sunny' '?' 'Yes' '?' '?']
```

```
In [1]: import numpy as np
        import pandas as pd
```

```
In [2]: print("Enter features separated by space")
        features = input().split()
        print("Features ", features)
        num_samples = int(input("enter number of samples: "))
```

```
Enter features separated by space
Time Weather Temperature Company Humidity Wind
Features  ['Time', 'Weather', 'Temperature', 'Company', 'Humidity', 'Wind']
enter number of samples: 4
```

```
In [11]: def findS():
             specific_hypothesis = ["n"]*len(features)
             for a in range(num_samples):
                 print("sample", a)

                 temp_features = input("Enter features: ").split()
                 target = input("Enter outcome: ")
                 if target == "Yes":
                     for x in range(len(specific_hypothesis)):
                         if specific_hypothesis[x] == "n":
                             specific_hypothesis[x] = temp_features[x]
                         elif temp_features[x] != specific_hypothesis[x]:
                             specific_hypothesis[x] = '?'
                 print("Specific hypothesis: ", specific_hypothesis)
             return specific_hypothesis
```

```
In [12]: print("\n The final hypothesis is:",findS())
```

```
sample 0
Enter features: Morning Sunny Warm Yes Mild Strong
Enter outcome: Yes
Specific hypothesis:  ['Morning', 'Sunny', 'Warm', 'Yes', 'Mild', 'Strong']
sample 1
Enter features: Evening Rainy Cold No Mild Normal
Enter outcome: No
Specific hypothesis:  ['Morning', 'Sunny', 'Warm', 'Yes', 'Mild', 'Strong']
sample 2
Enter features: Morning Sunny Moderate Yes Normal Normal
Enter outcome: Yes
Specific hypothesis:  ['Morning', 'Sunny', '?', 'Yes', '?', '?']
sample 3
Enter features: Evening Sunny Cold Yes High Strong
Enter outcome: Yes
Specific hypothesis:  ['?', 'Sunny', '?', 'Yes', '?', '?']

 The final hypothesis is: ['?', 'Sunny', '?', 'Yes', '?', '?']
```

2.For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

In [1]:

```python
import numpy as np
import pandas as pd
```

In [2]:

```python
data = pd.read_csv('mydata.csv')
concepts = np.array(data.iloc[:,0:-1])
print("\nInstances are:\n",concepts)
target = np.array(data.iloc[:,-1])
print("\nTarget Values are: ",target)
```

```
Instances are:
 [['sunny' 'warm' 'normal' 'strong' 'warm' 'same']
 ['sunny' 'warm' 'high' 'strong' 'warm' 'same']
 ['rainy' 'cold' 'high' 'strong' 'warm' 'change']
 ['sunny' 'warm' 'high' 'strong' 'cool' 'change']]

Target Values are:  ['yes' 'yes' 'no' 'yes']
```

In [5]:

```python
def learn(concepts, target):
    specific_h = ["null"]*len(concepts[0])
    print("\nInitialization of specific_h and general_h")
    print("\nSpecific Boundary: ", specific_h)
    specific_h = concepts[0].copy()
    general_h = [["?" for i in range(len(specific_h))] for i in range(len(specific_h))]
    print("\nGeneric Boundary: ",general_h)

    for i, h in enumerate(concepts):
        print("\nInstance", i+1 , "is ", h)
        if target[i] == "yes":
            print("Instance is Positive ")
            for x in range(len(specific_h)):
                if h[x]!= specific_h[x]:
                    specific_h[x] ='?'
                    general_h[x][x] ='?'

        if target[i] == "no":
            print("Instance is Negative ")
            for x in range(len(specific_h)):
                if h[x]!= specific_h[x]:
                    general_h[x][x] = specific_h[x]
                else:
                    general_h[x][x] = '?'
```


```python
                    general_h[x][x] = specific_h[x]
                else:
                    general_h[x][x] = '?'
```


```python
        print("Specific Bundary after ", i+1, "Instance is ", specific_h)
        print("Generic Boundary after ", i+1, "Instance is ", general_h)
        print("\n")

    indices = [i for i, val in enumerate(general_h) if val == ['?']*len(concepts[0])]
    for i in indices:
        general_h.remove(['?', '?', '?', '?', '?', '?'])
    return specific_h, general_h
```

In [6]:

```python
s_final, g_final = learn(concepts, target)

print("Final Specific_h: ", s_final, sep="\n")
print("Final General_h: ", g_final, sep="\n")
```

```
Initialization of specific_h and general_h

Specific Boundary:  ['null', 'null', 'null', 'null', 'null', 'null']

Generic Boundary:  [['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'],
['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]

Instance 1 is  ['sunny' 'warm' 'normal' 'strong' 'warm' 'same']
Instance is Positive
Specific Bundary after  1 Instance is  ['sunny' 'warm' 'normal' 'strong' 'warm' 'same']
Generic Boundary after  1 Instance is  [['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?',
'?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]



Instance 2 is  ['sunny' 'warm' 'high' 'strong' 'warm' 'same']
Instance is Positive
Specific Bundary after  2 Instance is  ['sunny' 'warm' '?' 'strong' 'warm' 'same']
Generic Boundary after  2 Instance is  [['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?',
'?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]



Instance 3 is  ['rainy' 'cold' 'high' 'strong' 'warm' 'change']
Instance is Negative
Specific Bundary after  3 Instance is  ['sunny' 'warm' '?' 'strong' 'warm' 'same']
Generic Boundary after  3 Instance is  [['sunny', '?', '?', '?', '?', '?'], ['?', 'warm', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?',
```

```
['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]

Instance 1 is  ['sunny' 'warm' 'normal' 'strong' 'warm' 'same']
Instance is Positive
Specific Bundary after  1 Instance is  ['sunny' 'warm' 'normal' 'strong' 'warm' 'same']
Generic Boundary after  1 Instance is  [['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?',
'?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]


Instance 2 is  ['sunny' 'warm' 'high' 'strong' 'warm' 'same']
Instance is Positive
Specific Bundary after  2 Instance is  ['sunny' 'warm' '?' 'strong' 'warm' 'same']
Generic Boundary after  2 Instance is  [['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?',
'?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]


Instance 3 is  ['rainy' 'cold' 'high' 'strong' 'warm' 'change']
Instance is Negative
Specific Bundary after  3 Instance is  ['sunny' 'warm' '?' 'strong' 'warm' 'same']
Generic Boundary after  3 Instance is  [['sunny', '?', '?', '?', '?', '?'], ['?', 'warm', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?',
'?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', 'same']]


Instance 4 is  ['sunny' 'warm' 'high' 'strong' 'cool' 'change']
Instance is Positive
Specific Bundary after  4 Instance is  ['sunny' 'warm' '?' 'strong' '?' '?']
Generic Boundary after  4 Instance is  [['sunny', '?', '?', '?', '?', '?'], ['?', 'warm', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?',
'?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?'], ['?', '?', '?', '?', '?', '?']]


Final Specific_h:
['sunny' 'warm' '?' 'strong' '?' '?']
Final General_h:
[['sunny', '?', '?', '?', '?', '?'], ['?', 'warm', '?', '?', '?', '?']]
```

In [ ]:

3.Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

In [1]:
```python
import pandas as pd

import numpy as np

from sklearn.datasets import load_iris

data = load_iris()
```

In [2]:
```python
df = pd.DataFrame(data.data, columns = data.feature_names)
```

In [3]:
```python
df.head()
```

Out[3]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
0	5.1	3.5	1.4	0.2
1	4.9	3.0	1.4	0.2
2	4.7	3.2	1.3	0.2
3	4.6	3.1	1.5	0.2
4	5.0	3.6	1.4	0.2

In [4]:
```python
df['Species'] = data.target

#replace this with the actual names

target = np.unique(data.target)

target_names = np.unique(data.target_names)

targets = dict(zip(target, target_names))

df['Species'] = df['Species'].replace(targets)
```

In [5]:
```python
x = df.drop(columns="Species")
```

In [5]:
```python
x = df.drop(columns="Species")

y = df["Species"]
```

In [6]:
```python
feature_names = x.columns
labels = y.unique()
```

In [7]:
```python
from sklearn.model_selection import train_test_split

X_train, test_x, y_train, test_lab = train_test_split(x,y,test_size = 0.4,random_state = 42)
```

In [10]:
```python
from sklearn.tree import DecisionTreeClassifier
clf = DecisionTreeClassifier(random_state = 42, criterion="entropy")
```

In [11]:
```python
clf.fit(X_train, y_train)
```

Out[11]:
```
DecisionTreeClassifier(criterion='entropy', random_state=42)
```

In [12]:
```python
test_pred = clf.predict(test_x)
```

In [13]:
```python
from sklearn import metrics

import seaborn as sns

import matplotlib.pyplot as plt

confusion_matrix = metrics.confusion_matrix(test_lab,test_pred)
```

In [14]:
```python
confusion_matrix
```

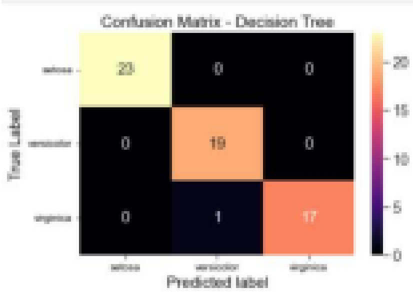
Out[14]:
```
array([[23,  0,  0],
       [ 0, 19,  0],
       [ 0,  1, 17]], dtype=int64)
```

In [15]:
```python
matrix_df = pd.DataFrame(confusion_matrix)
```


In [14]:
```python
confusion_matrix
```

Out[14]:
```
array([[23,  0,  0],
       [ 0, 19,  0],
       [ 0,  1, 17]], dtype=int64)
```

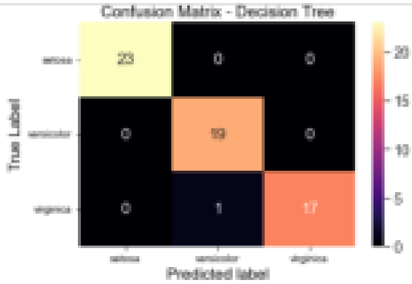

In [15]:
```python
matrix_df = pd.DataFrame(confusion_matrix)
ax = plt.axes()
sns.set(font_scale=1.3)
plt.figure(figsize=(10,7))
sns.heatmap(matrix_df, annot=True, fmt="g", ax=ax, cmap="magma")
ax.set_title('Confusion Matrix - Decision Tree')
ax.set_xlabel("Predicted label", fontsize =15)
ax.set_xticklabels(['']+labels)
ax.set_ylabel("True Label", fontsize=15)
ax.set_yticklabels(list(labels), rotation = 0)
plt.show()
```




```
<Figure size 720x504 with 0 Axes>
```

In [16]:
```python
clf.score(test_x,test_lab)
```

Out[16]:
```
0.9833333333333333
```



<Figure size 720x504 with 0 Axes>

In [16]:

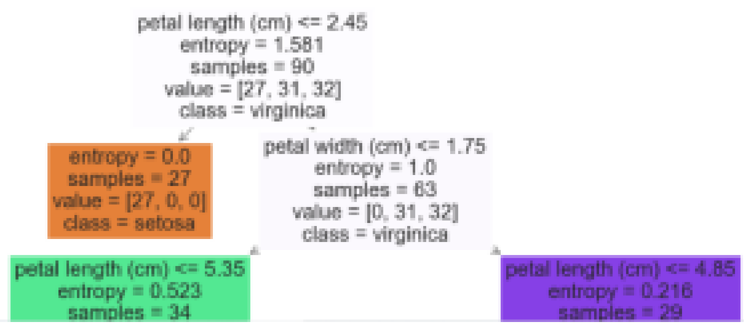
```
clf.score(test_x,test_lab)
```

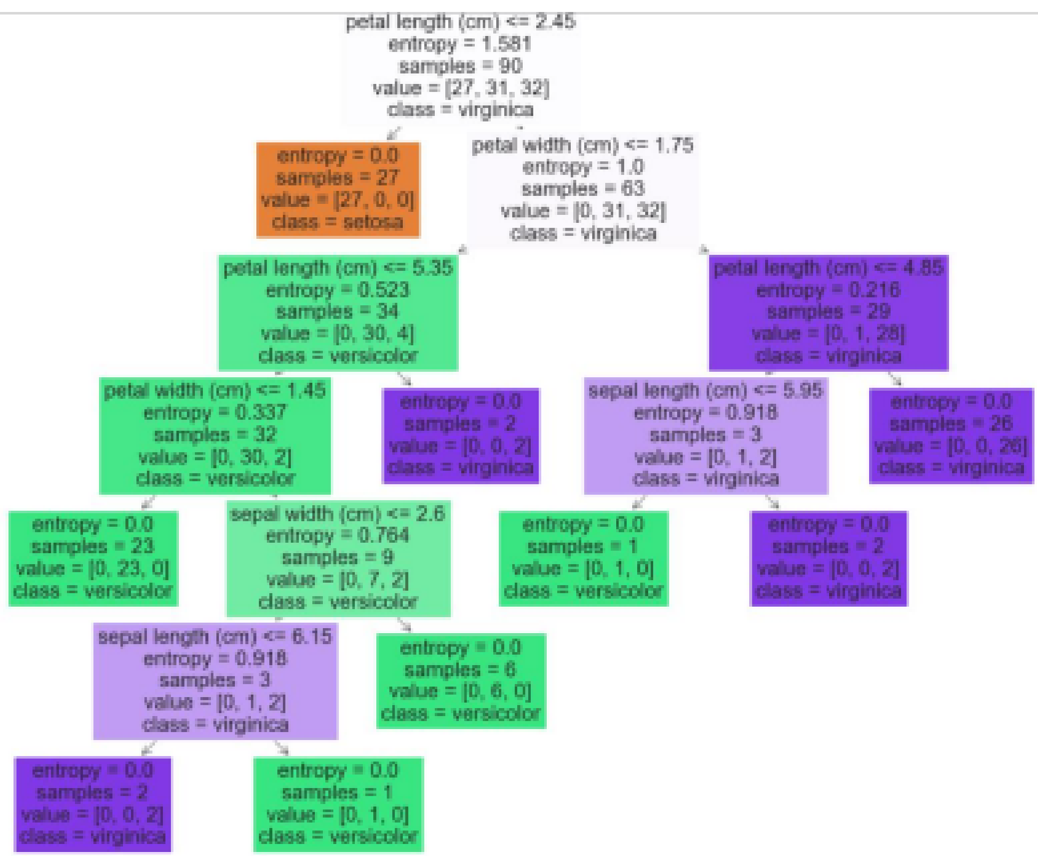
Out[16]:

```
0.9833333333333333
```

In [17]:

```
from sklearn import tree
fig = plt.figure(figsize=(25,20))
_ = tree.plot_tree(clf,
                   feature_names=data.feature_names,
                   class_names=data.target_names,
                   filled=True)
```





```
In [1]: import pandas as pd
        import math
        import numpy as np
```

```
In [2]: data = pd.read_csv("dataset.csv")
        features = [feat for feat in data]
        features.remove("answer")
```

```
In [3]: features
```

```
Out[3]: ['outlook', 'temperature', 'humidity', 'wind']
```

```
In [4]: data
```

Out[4]:

	outlook	temperature	humidity	wind	answer
0	sunny	hot	high	weak	no
1	sunny	hot	high	strong	no
2	overcast	hot	high	weak	yes
3	rain	mild	high	weak	yes
4	rain	cool	normal	weak	yes
5	rain	cool	normal	strong	no
6	overcast	cool	normal	strong	yes
7	sunny	mild	high	weak	no
8	sunny	cool	normal	weak	yes
9	rain	mild	normal	weak	yes
10	sunny	mild	normal	strong	yes
11	overcast	mild	high	strong	yes
12	overcast	hot	normal	weak	yes
13	rain	mild	high	strong	no

```
In [5]: class Node:
            def __init__(self):
                self.children = []
                self.value = ""
                self.isLeaf = False
                self.pred = ""
```

```
In [5]: def entropy(examples):
            pos = 0.0
            neg = 0.0
            for _, row in examples.iterrows():
                if row["answer"] == "yes":
                    pos += 1
                else:
                    neg += 1
            if pos == 0.0 or neg == 0.0:
                return 0.0
            else:
                p = pos / (pos + neg)
                n = neg / (pos + neg)
                return -(p * math.log(p, 2) + n * math.log(n, 2))
```

```
In [6]: def info_gain(examples, attr):
            uniq = np.unique(examples[attr])
            #print ("\n",uniq)
            gain = entropy(examples)
            #print ("\n",gain)
            for u in uniq:
                subdata = examples[examples[attr] == u]
                #print ("\n",subdata)
                sub_e = entropy(subdata)
                gain -= (float(len(subdata)) / float(len(examples))) * sub_e
                #print ("\n",gain)
            return gain
```

```
In [8]: def ID3(examples, attrs):
```

4.Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

```python
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import GaussianNB
from sklearn import metrics

df = pd.read_csv("pima_indian.csv")
feature_col_names = ['num_preg', 'glucose_conc', 'diastolic_bp', 'thickness', 'insulin', 'bmi', 'diab_pred', 'age']
predicted_class_names = ['diabetes']
X = df[feature_col_names].values
y = df[predicted_class_names].values
xtrain,xtest,ytrain,ytest=train_test_split(X,y,test_size=0.33)
```

[18] Python

```python
df.head()
```

[19] Python

	num_preg	glucose_conc	diastolic_bp	thickness	insulin	bmi	diab_pred	age	diabetes
0	6	148	72	35	0	33.6	0.627	50	1
1	1	85	66	29	0	26.6	0.351	31	0
2	8	183	64	0	0	23.3	0.672	32	1
3	1	89	66	23	94	28.1	0.167	21	0
4	0	137	40	35	168	43.1	2.288	33	1

```python
clf = GaussianNB().fit(xtrain,ytrain.ravel())
predicted = clf.predict(xtest)
predictTestData= clf.predict([[6,148,72,35,0,33.6,0.627,50]])
```

[29] Python

```python
metrics.confusion_matrix(ytest,predicted)
```

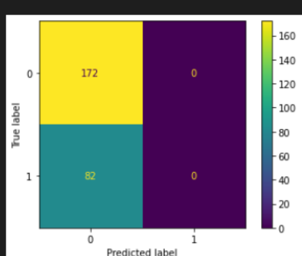
[30] Python

```
array([[139,  26],
       [ 33,  56]], dtype=int64)
```

```python
print('\nConfusion matrix')
print(metrics.plot_confusion_matrix(clf,ytest,predicted))
```

[28] Python

```
Confusion matrix
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay object at 0x00000190E55B3670>
```




```python
print(metrics.classification_report(ytest,predicted))
```

[31] Python

```
              precision    recall  f1-score   support

           0       0.81      0.84      0.82       165
           1       0.68      0.63      0.65        89

    accuracy                           0.77       254
   macro avg       0.75      0.74      0.74       254
weighted avg       0.76      0.77      0.77       254
```

```python
print("Predicted Value for individual Test Data:", predictTestData)
```

[8] Python

```
Predicted Value for individual Test Data: [1]
```

```python
import numpy as np
import pandas as pd
```

[1] Python

```python
data = pd.read_csv('/content/dataset.csv')
data.head()
```

[2] Python

	PlayTennis	Outlook	Temperature	Humidity	Wind
0	No	Sunny	Hot	High	Weak
1	No	Sunny	Hot	High	Strong
2	Yes	Overcast	Hot	High	Weak
3	Yes	Rain	Mild	High	Weak
4	Yes	Rain	Cool	Normal	Weak

```python
y = list(data['PlayTennis'].values)
X = data.iloc[:,1:].values
print(f'Target Values: {y}')
print(f'Features: \n{X}')
```

[3] Python

```
Target Values: ['No', 'No', 'Yes', 'Yes', 'Yes', 'No', 'Yes', 'No', 'Yes', 'Yes', 'Yes', 'Yes', 'Yes', 'No']
Features:
[['Sunny' 'Hot' 'High' 'Weak']
 ['Sunny' 'Hot' 'High' 'Strong']
 ['Overcast' 'Hot' 'High' 'Weak']
 ['Rain' 'Mild' 'High' 'Weak']
 ['Rain' 'Cool' 'Normal' 'Weak']
 ['Rain' 'Cool' 'Normal' 'Strong']
 ['Overcast' 'Cool' 'Normal' 'Strong']
 ['Sunny' 'Mild' 'High' 'Weak']
 ['Sunny' 'Cool' 'Normal' 'Weak']
 ['Rain' 'Mild' 'Normal' 'Weak']
 ['Sunny' 'Mild' 'Normal' 'Strong']
```

```python
y_train = y[:8]
y_val = y[8:]
X_train = X[:8]
X_val = X[8:]
print(f"Number of instances in training set: {len(X_train)}")
print(f"Number of instances in testing set: {len(X_val)}")
```

4] Pyth

```
Number of instances in training set: 8
Number of instances in testing set: 6
```

```python
class NaiveBayesClassifier:
    def __init__(self, X, y):
        self.X, self.y = X, y
        self.N = len(self.X)
        self.dim = len(self.X[0])
        self.attrs = [[] for _ in range(self.dim)]
        self.output_dom = {}
        self.data = []
        for i in range(len(self.X)):
            for j in range(self.dim):
                if not self.X[i][j] in self.attrs[j]:
                    self.attrs[j].append(self.X[i][j])
            if not self.y[i] in self.output_dom.keys():
                self.output_dom[self.y[i]] = 1
            else:
                self.output_dom[self.y[i]] += 1
            self.data.append([self.X[i], self.y[i]])
    def classify(self, entry):
        solve = None
        max_arg = -1
        for y in self.output_dom.keys():
            prob = self.output_dom[y]/self.N
            for i in range(self.dim):
                cases = [x for x in self.data if x[0][i] == entry[i] and x[1] == y]
                n = len(cases)
                prob *= n/self.N
            if prob > max_arg:
                max_arg = prob
                solve = y
        return solve
```

```python
nbc = NaiveBayesClassifier(X_train, y_train)
total_cases = len(y_val)
good = 0
bad = 0
predictions = []
for i in range(total_cases):
    predict = nbc.classify(X_val[i])
    predictions.append(predict)
    if y_val[i] == predict:
        good += 1
    else:
        bad += 1
print('Predicted values:', predictions)
print('Actual values:', y_val)
print()
print('Total number of testing instances in the dataset:', total_cases)
print('Number of correct predictions:', good)
print('Number of wrong predictions:', bad)
print()
print('Accuracy of Bayes Classifier:', good/total_cases)
```

[6]

```
Predicted values: ['No', 'Yes', 'No', 'Yes', 'Yes', 'No']
Actual values: ['Yes', 'Yes', 'Yes', 'Yes', 'Yes', 'No']

Total number of testing instances in the dataset: 6
Number of correct predictions: 4
Number of wrong predictions: 2

Accuracy of Bayes Classifier: 0.6666666666666666
```

5.Write a program to construct a Bayesian network considering training data. Use this model to make predictions.

```python
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
```

[1] Python

```python
dataset = pd.read_csv('salary_dataset.csv')
X = dataset.iloc[:, :-1].values
y = dataset.iloc[:, 1].values
```

[2] Python

```python
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=1/3, random_state=0)
```

[3] Python

```python
# Fitting Simple Linear Regression to the Training set
from sklearn.linear_model import LinearRegression
regressor = LinearRegression()
regressor.fit(X_train, y_train)
```

[4] Python

```
LinearRegression()
```

```python
# Predicting the Test set results
y_pred = regressor.predict(X_test)
```

[5] Python

```python
# Visualizing the Training set results
viz_train = plt
viz_train.scatter(X_train, y_train, color='red')
viz_train.plot(X_train, regressor.predict(X_train), color='blue')
viz_train.title('Salary VS Experience (Training set)')
viz_train.xlabel('Year of Experience')
viz_train.ylabel('Salary')
```


```python
# Visualizing the Test set results
viz_test = plt
viz_test.scatter(X_test, y_test, color='red')
viz_test.plot(X_train, regressor.predict(X_train), color='blue')
viz_test.title('Salary VS Experience (Test set)')
viz_test.xlabel('Year of Experience')
viz_test.ylabel('Salary')
viz_test.show()
```

7] Pytho