Machine Learning Lab (PMCA507P)

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**Exercise 5b : Decision Tree Classifier (Split the data set)**
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Exercise 5b : Decision Tree Classifier (Split the data set)

Collab url : https://colab.research.google.com/drive/1DaWfAzQzPKGcdO23_1fKaok9w698DYT2?usp=sharing

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```
import numpy as np
import pandas as pd
from sklearn import metrics
```

```
df=pd.read_csv("/content/PlayTennis.csv")
value=['Outlook','Temperature','Humidity','Wind']
df
```

	Outlook	Temperature	Humidity	Wind	Play
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

```
len(df)
```

```
14
```

```
df.shape
```

```
(14, 5)
```

```
df.head()
```

	Outlook	Temperature	Humidity	Wind	Play
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

```
df.tail()
```

	Outlook	Temperature	Humidity	Wind	Play
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

```
df.describe()
```

	Outlook	Temperature	Humidity	Wind	Play
count	14	14	14	14	14
unique	3	3	2	2	2
top	Sunny	Mild	High	Weak	Yes
freq	5	6	7	8	9

```
from sklearn import preprocessing
string_to_int= preprocessing.LabelEncoder()
df=df.apply(string_to_int.fit_transform)
df
```

	Outlook	Temperature	Humidity	Wind	Play
0	2	1	0	1	0
1	2	1	0	0	0
2	0	1	0	1	1
3	1	2	0	1	1
4	1	0	1	1	1
5	1	0	1	0	0
6	0	0	1	0	1
7	2	2	0	1	0
8	2	0	1	1	1
9	1	2	1	1	1
10	2	2	1	0	1
11	0	2	0	0	1
12	0	1	1	1	1
13	1	2	0	0	0

```
feature_cols =['Outlook','Temperature','Humidity','Wind']
X = df[feature_cols]
y = df.Play
```

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.30)
```

```
from sklearn.tree import DecisionTreeClassifier
classifier =DecisionTreeClassifier(criterion="entropy", random_state=100)
classifier.fit(X_train, y_train)
```

```
▾                    DecisionTreeClassifier
DecisionTreeClassifier(criterion='entropy', random_state=100)
```

```
y_pred= classifier.predict(X_test)
```

```
from sklearn.metrics import accuracy_score
print("Accuracy:",metrics.accuracy_score(y_test, y_pred))
```

```
Accuracy: 0.8
```

```
data_p=pd.DataFrame({'Actual':y_test, 'Predicted':y_pred})
data_p
```

	Actual	Predicted
9	1	1
2	1	1
0	0	0
4	1	1

Evaluating the Algorithm

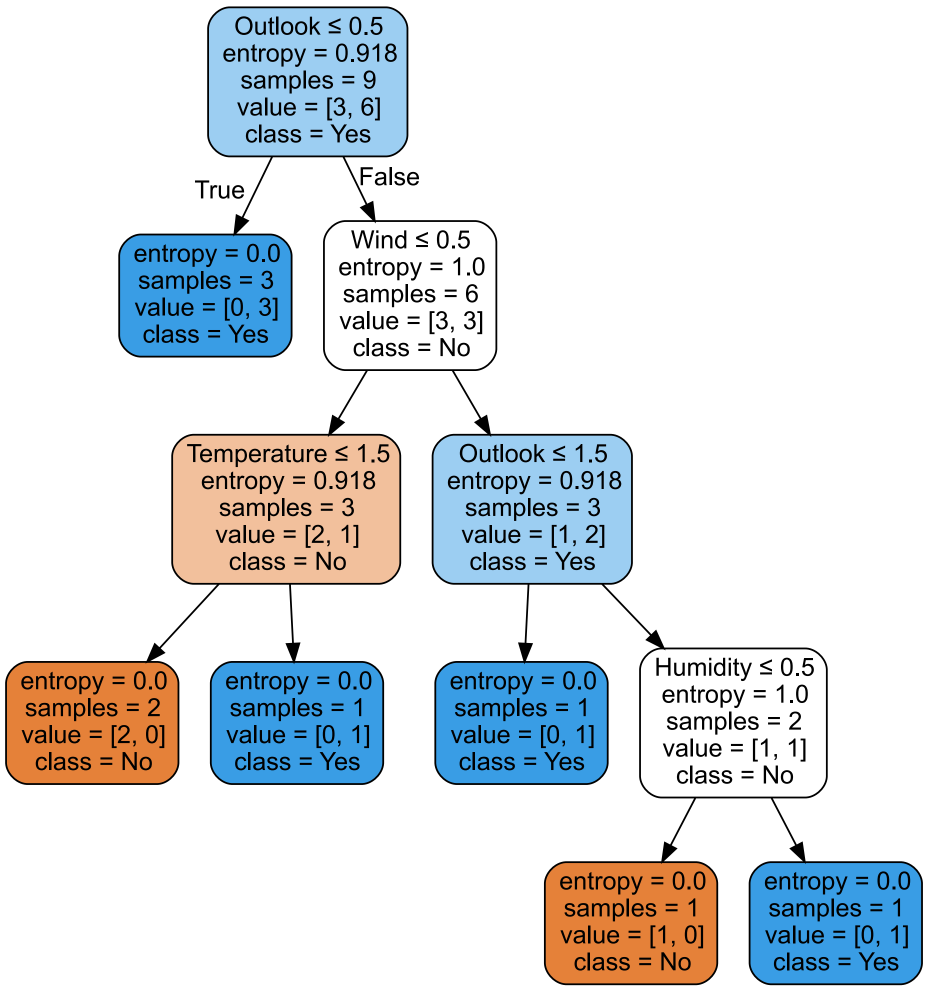
```
from sklearn.metrics import classification_report, confusion_matrix
print(confusion_matrix(y_test, y_pred))
print(classification_report(y_test, y_pred))
```

```
[[1 1]
 [0 3]]
              precision    recall  f1-score   support

           0       1.00      0.50      0.67         2
           1       0.75      1.00      0.86         3

    accuracy                           0.80         5
   macro avg       0.88      0.75      0.76         5
weighted avg       0.85      0.80      0.78         5
```

```
from sklearn.tree import export_graphviz
import graphviz
dot_data = export_graphviz(classifier, out_file=None, feature_names=feature_cols, class_names=['No', 'Yes'], filled=True, rounded=True, special_chara
graph = graphviz.Source(dot_data)
graph
```


Outlook ≤ 0.5
entropy = 0.918
samples = 9
value = [3, 6]
class = Yes
True
False
entropy = 0.0
samples = 3
value = [0, 3]
class = Yes
Wind ≤ 0.5
entropy = 1.0
samples = 6
value = [3, 3]
class = No
Temperature ≤ 1.5
entropy = 0.918
samples = 3
value = [2, 1]
class = No
Outlook ≤ 1.5
entropy = 0.918
samples = 3
value = [1, 2]
class = Yes
entropy = 0.0
samples = 2
value = [2, 0]
class = No
entropy = 0.0
samples = 1
value = [0, 1]
class = Yes
entropy = 0.0
samples = 1
value = [0, 1]
class = Yes
Humidity ≤ 0.5
entropy = 1.0
samples = 2
value = [1, 1]
class = No
entropy = 0.0
samples = 1
value = [1, 0]
class = No
entropy = 0.0
samples = 1
value = [0, 1]
class = Yes