**EX-9**

**PROGRAM:**

import numpy as np

import pandas as pd

from sklearn.model\_selection import train\_test\_split

from sklearn.ensemble import RandomForestClassifier

from sklearn.metrics import classification\_report, confusion\_matrix

from sklearn import tree

import matplotlib.pyplot as plt

# Load your dataset

data = pd.read\_csv("decisiontree.csv")

# Define the features and target variable

features = ['Age', 'Income', 'Credit']

X = data[features]

y = data['Buy']

# Split the data into training and testing sets

X\_train, X\_test, y\_train, y\_test = train\_test\_split(X, y, test\_size=0.3, random\_state=44)

# Create a Random Forest classifier with 'max\_features' set to 'None'

rf = RandomForestClassifier(n\_estimators=3, max\_depth=2, max\_features=None, bootstrap=True)

rf.fit(X\_train, y\_train)

# Make predictions on the test set

y\_pred = rf.predict(X\_test)

# Compute and print confusion matrix and classification report

cm = confusion\_matrix(y\_test, y\_pred)

print("Confusion Matrix")

print(cm)

print("Classification Report")

print(classification\_report(y\_test, y\_pred))

# Visualize one of the decision trees in the Random Forest

fig = plt.figure(figsize=(12, 12), facecolor='w')

tree.plot\_tree(rf.estimators\_[0], feature\_names=features, class\_names=["0", "1"], filled=True, fontsize=9)

plt.show()

**DATASET:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sno** | **Age** | **Income** | **Student** | **Credit** | **Buy** |
| 1 | 18 | 50000 | yes | 1 | no |
| 2 | 18 | 50000 | no | 2 | no |
| 3 | 25 | 50000 | no | 1 | yes |
| 4 | 60 | 30000 | no | 1 | yes |
| 5 | 62 | 10000 | yes | 1 | yes |
| 6 | 60 | 10000 | yes | 2 | no |
| 7 | 27 | 10000 | yes | 2 | yes |
| 8 | 16 | 30000 | no | 1 | no |
| 9 | 20 | 10000 | yes | 1 | yes |
| 10 | 69 | 30000 | yes | 1 | yes |
| 11 | 20 | 30000 | yes | 2 | yes |
| 12 | 28 | 30000 | no | 2 | yes |
| 13 | 29 | 50000 | yes | 1 | yes |
| 14 | 68 | 30000 | no | 2 | no |

**OUTPUT:**

|  |
| --- |
| **Confusion Matrix** |
| [[1 1] |
| [0 3]] |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Classification Report** | | | | |
|  | **precision** | **recall** | **f1-score** | **support** |
|  |  |  |  |  |
| no | 1.00 | 0.50 | 0.67 | 2 |
| yes | 0.75 | 1.00 | 0.86 | 3 |
|  |  |  |  |  |
| accuracy |  |  | 0.80 | 5 |
| macro avg | 0.88 | 0.75 | 0.76 | 5 |
| weighted avg | 0.85 | 0.8 | 0.78 | 5 |

