A PYTHON PROGRAM TO IMPLEMENT DECISION TREE

Ex.No.: 7
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AIM:-

To implement a decision tree using a python program for the given dataset and plot the trained decision tree.

ALGORITHM:-

Step1: Import the iris dataset from the “sklearn.datasets” library.

Step2: Import all the other necessary libraries(numpy as np, matplotlib.pyplot as plt and DecisionTreeClassifier from sklearn.tree).

Step3: Declare and initialize the parameters(n_classes = 3,plot_colors = "ryb" and plot_step = 0.02)

Step4: Loop through the list of features and assign “X” with all the pairs in the list and “Y” with the target list.

Step5: Train the model and assign it to a variable name “clt”.

Step6: Use the “pairidx” variable to plot the graph.

Step7: Assign “x_min”, “x_max”, “y_min” and “y_max” variables with the respective values from the list.

Step8: Assign the variables “X” and “Y” the values obtained by using the “meshgrid()” function on arranged x_min,x_max and y_min,y_max.

Step9: Plot the graph using the “tight_layout” function and the following parameters(h_pad=0.5, w_pad=0.5, pad=2.5).

Step10: Assign the prediction using the variables “xx” and “yy” and then reshape Z to the shape of “xx”.

Step11: Plot the graphs using “xx”, “yy” and “Z” as the parameters and with the “RdYlBu”(red,yellow and blue) color scheme.

Step12: Plot all the x_label and y_label feature pairs.

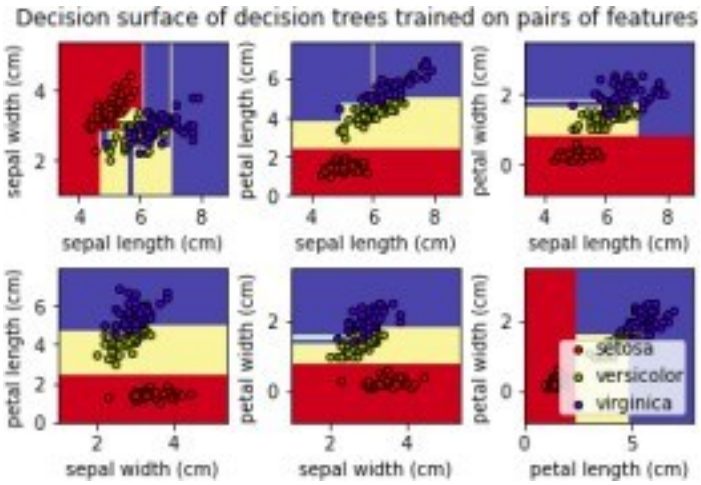
Step13: Plot all the training points with “RdYlBu " color scheme, black color to represent the points and with size equal to 15.

Step14: Plot the final decision tree with the title “Decision tree trained on all the iris

features”. **IMPLEMENTATION:-**

```
from sklearn.datasets import load_iris
iris = load_iris()

import numpy as np
import matplotlib.pyplot as plt
from sklearn.tree import DecisionTreeClassifier

# Parameters
n_classes = 3
plot_colors = "ryb"
plot_step = 0.02


for pairidx, pair in enumerate([[0, 1], [0, 2], [0, 3], [1, 2], [1, 3], [2, 3]]):
    # We only take the two corresponding features
    X = iris.data[:, pair]
    y = iris.target

    # Train
    clf = DecisionTreeClassifier().fit(X, y)

    # Plot the decision boundary
    plt.subplot(2, 3, pairidx + 1)

    x_min, x_max = X[:, 0].min() - 1, X[:, 0].max() + 1
    y_min, y_max = X[:, 1].min() - 1, X[:, 1].max() + 1
```

```
            xx, yy = np.meshgrid(


        np.arange(x_min, x_max, plot_step), np.arange(y_min, y_max, plot_step)
    )
    plt.tight_layout(h_pad=0.5, w_pad=0.5, pad=2.5)

    Z = clf.predict(np.c_[xx.ravel(), yy.ravel()])
    Z = Z.reshape(xx.shape)
    cs = plt.contourf(xx, yy, Z, cmap=plt.cm.RdYlBu)

    plt.xlabel(iris.feature_names[pair[0]])
    plt.ylabel(iris.feature_names[pair[1]])

    # Plot the training points
    for i, color in zip(range(n_classes), plot_colors):
        idx = np.where(y == i)
        plt.scatter(
            X[idx, 0],
            X[idx, 1],
            c=color,
            label=iris.target_names[i],
            cmap=plt.cm.RdYlBu,
            edgecolor="black",
            s=15)

plt.suptitle("Decision surface of decision trees trained on pairs of features")
plt.legend(loc="lower right", borderpad=0, handletextpad=0)
_ = plt.axis("tight")
```



from sklearn.tree import plot_tree

```
plt.figure()
clf = DecisionTreeClassifier().fit(iris.data,iris.target)
plot_tree(clf, filled=True)
plt.title("Decision tree trained on all the iris features")
plt.show()
```

RESULT:-

Thus the python program to implement Decision Tree for the given dataset has been successfully implemented and the results have been verified and analyzed.