## A PYTHON PROGRAM TO IMPLEMENT DECISION TREE

Ex.No.: DATE: 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
          from
                      sklearn.tree
                                          import
plt
DecisionTreeClassifier
#
           Parameters
n_classes
               =
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)

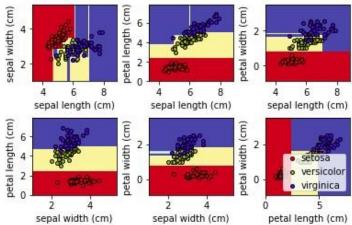
plt.xlabel(iris.feature_names[pair[0]])
plt.ylabel(iris.feature_names[pair[1]])

# 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")



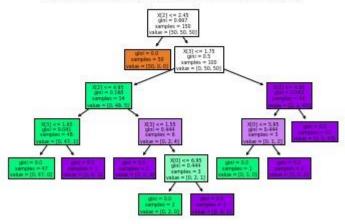


from sklearn.tree import plot\_tree

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()

Decision tree trained on all the iris features



## **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.