

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
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)

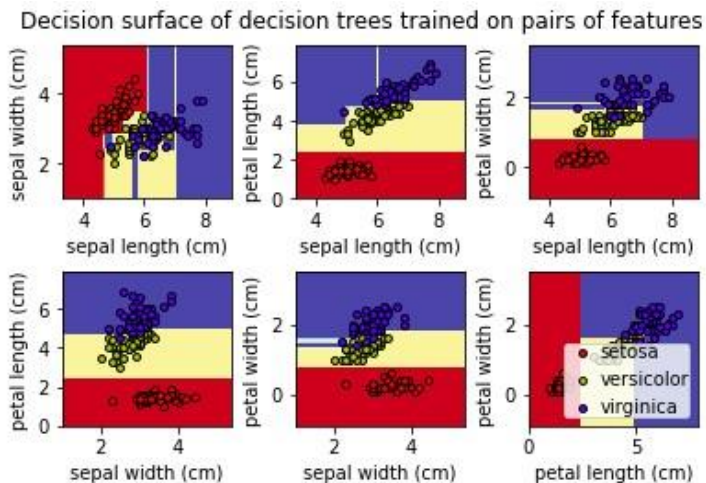
Z = clf.predict(np.c_[xx.ravel(), yy.ravel()]) Z =
Z.reshape(xx.shape) cs = plt.contourf(xx, yy, Z,
cmap=plt.cm.RdYlBu)

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")

```



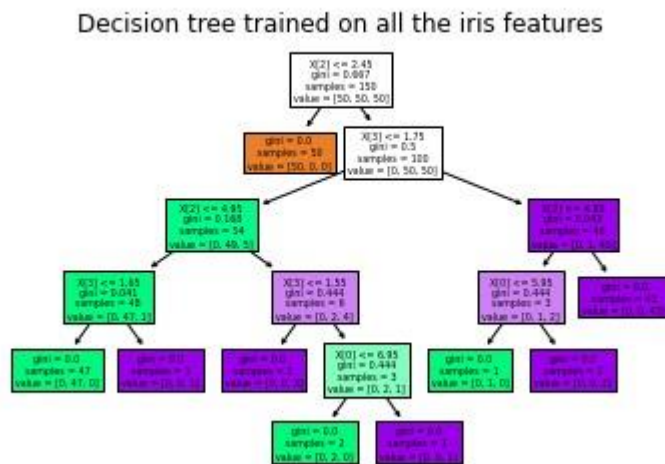
```

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.