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Q1

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In [ ]: from sklearn.datasets import load_iris
        from sklearn import tree
        from sklearn.model_selection import train_test_split
        from sklearn.metrics import accuracy_score
        import numpy as np
        import pandas as pd
In [ ]: iris = load_iris(as_frame=True)
        X = iris["data"]
        y = iris["target"]
        X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.20, random_
In [ ]: dt = tree.DecisionTreeClassifier()
        model = dt.fit(X_train, y_train)
In [ ]: preds = model.predict(X_test)
        print(f"Accuracy : {accuracy_score(y_test, preds)*100}%")
       Accuracy: 96.6666666666667%
In [ ]: tree.plot_tree(model)
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Out[]: [Text(0.4, 0.91666666666666666, 'x[3] <= 0.8\ngini = 0.665\nsamples = 120\nvalue =
                                                [39, 44, 37]'),
                                                     Text(0.3, 0.75, 'gini = 0.0 \land samples = 39 \land value = [39, 0, 0]'),
                                                     Text(0.5, 0.75, x[3] \le 1.65 \cdot 1.65 
                                                     Text(0.2, 0.5833333333333334, 'x[2] <= 4.95 \ngini = 0.156 \nsamples = 47 \nvalue =
                                                  [0, 43, 4]'),
                                                     Text(0.1, 0.4166666666666667, 'gini = 0.0 \nsamples = 42 \nvalue = [0, 42, 0]'),
                                                     Text(0.3, 0.4166666666666666, 'x[3] <= 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 5 / nvalue = 1.55 / ngini = 0.32 / nsamples = 1.55 / nsamples = 1.5
                                                  [0, 1, 4]'),
                                                     Text(0.2, 0.25, 'gini = 0.0\nsamples = 3\nvalue = [0, 0, 3]'),
                                                     Text(0.4, 0.25, 'x[2] \leftarrow 5.45 \cdot = 0.5 \cdot = 2 \cdot = [0, 1, 1]'),
                                                     Text(0.8, 0.58333333333333334, 'x[2] <= 4.85 / ngini = 0.057 / nsamples = 34 / nvalue = 34 / nvalu
                                                  [0, 1, 33]'),
                                                     Text(0.7, 0.4166666666666667, 'x[1] <= 3.1 \ngini = 0.375 \nsamples = 4 \nvalue =
                                                  [0, 1, 3]'),
                                                     Text(0.6, 0.25, 'gini = 0.0\nsamples = 3\nvalue = [0, 0, 3]'),
                                                     Text(0.8, 0.25, 'gini = 0.0 \land samples = 1 \land value = [0, 1, 0]'),
                                                     Text(0.9, 0.416666666666667, 'gini = 0.0\nsamples = 30\nvalue = [0, 0, 30]')]
                                                                                                                                                                             x[3] \le 0.8
                                                                                                                                                                             gini = 0.665
                                                                                                                                                                        samples = 120
                                                                                                                                                                value = [39, 44, 37]
                                                                                                                                                                                                                  x[3] \le 1.65
                                                                                                                                          gini = 0.0
                                                                                                                                                                                                                   gini = 0.496
                                                                                                                                   samples = 39
                                                                                                                                                                                                                 samples = 81
                                                                                                                             value = [39, 0, 0]
                                                                                                                                                                                                         value = [0, 44, 37]
                                                                                              x[2] <= 4.95
gini = 0.156
                                                                                                                                                                                                                                                                                                                                    x[2] <= 4.85
gini = 0.057
                                                                                              samples = 47
                                                                                                                                                                                                                                                                                                                                    samples = 34
                                                                                       value = [0, 43, 4]
                                                                                                                                                                                                                                                                                                                             value = [0, 1, 33]
                                                                                                                                      x[3] \le 1.55
                                                                                                                                                                                                                                                                                                 x[1] \le 3.1
                                                              gini = 0.0
                                                                                                                                                                                                                                                                                                                                                                                gini = 0.0
                                                                                                                                        gini = 0.32
                                                                                                                                                                                                                                                                                                aini = 0.375
                                                        samples = 42
                                                                                                                                                                                                                                                                                                                                                                          samples = 30
                                                                                                                                      samples = 5
                                                                                                                                                                                                                                                                                              samples = 4
                                                 value = [0, 42, 0]
                                                                                                                                                                                                                                                                                                                                                                   value = [0, 0, 30]
                                                                                                                                value = [0, 1, 4]
                                                                                                                                                                                                                                                                                         value = [0, 1, 3]
                                                                                                                                                                            x[2] \le 5.45
                                                                                                     gini = 0.0
                                                                                                                                                                                                                                                             gini = 0.0
                                                                                                                                                                                                                                                                                                                                          gini = 0.0
                                                                                                                                                                                 gini = 0.5
                                                                                                                                                                                                                                                                                                                                      samples = 1
                                                                                                samples = 3
                                                                                                                                                                                                                                                         samples = 3
                                                                                                                                                                             samples = 2
                                                                                          value = [0, 0, 3]
                                                                                                                                                                                                                                                  value = [0, 0, 3]
                                                                                                                                                                                                                                                                                                                               value = [0, 1, 0]
                                                                                                                                                                     value = [0, 1, 1]
```

gini = 0.0

samples = 1

value = [0, 0, 1]

gini = 0.0

samples = 1

value = [0, 1, 0]