```
Decision Tree Algorithms: ID3
```

```
1 import numpy as np
 2 from sklearn.datasets import load_iris
 3 from sklearn.tree import DecisionTreeClassifier, export_graphviz
 4 import pydotplus
 5 from IPython.display import Image
 7 # Loading the Iris dataset
 8 iris = load_iris()
 9 X = iris.data
10 y = iris.target
11 feature_names = iris.feature_names
12 class_names = iris.target_names
14 # Creating a decision tree classifier using the ID3 algorithm
15 dt = DecisionTreeClassifier(criterion='entropy')
16 dt.fit(X, y)
17
18 # Generating the decision tree visualization
19 dot data = export graphviz(dt, out file=None, feature names=feature names, class names=class names, filled=True)
20 graph = pydotplus.graph_from_dot_data(dot_data)
21 Image(graph.create_png())
₽
                                                                petal length (cm) <= 2.45
                                                                    entropy = 1.585
                                                                     samples = 150
                                                                   value = [50, 50, 50]
                                                                     class = setosa
                                                                                  False
                                                                True
                                                                             petal width (cm) <= 1.75
                                                         entropy = 0.0
                                                                                  entropy = 1.0
                                                         samples = 50
                                                                                 samples = 100
                                                        value = [50, 0, 0]
                                                                                value = [0, 50, 50]
                                                         class = setosa
                                                                                class = versicolor
                                                           petal length (cm) <= 4.95
                                                                                              petal length (cm) <= 4.85
                                                               entropy = 0.445
                                                                                                   entropy = 0.151
                                                                samples = 54
                                                                                                    samples = 46
                                                               value = [0, 49, 5]
                                                                                                  value = [0, 1, 45]
                                                              class = versicolor
                                                                                                  class = virginica
                        petal width (cm) <= 1.65
                                                           petal width (cm) <= 1.55
                                                                                               sepal width (cm) <= 3.1
                                                                                                                            entropy = 0.0
                                                                                                   entropy = 0.918
                            entropy = 0.146
                                                               entropy = 0.918
                                                                                                                            samples = 43
                            samples = 48
value = [0, 47, 1]
                                                                samples = 6
                                                                                                    samples = 3
                                                                                                                           value = [0, 0, 43]
                                                               value = [0, 2, 4]
                                                                                                   value = [0, 1, 2]
                                                                                                                           class = virginica
                           class = versicolor
                                                               class = virginica
                                                                                                  class = virginica
                                                                     sepal length (cm) <= 6.95
        entropy = 0.0
                                                  entropy = 0.0
                                                                                                    entropy = 0.0
                             entropy = 0.0
                                                                                                                         entropy = 0.0
                                                                          entropy = 0.918
        samples = 47
                             samples = 1
                                                  samples = 3
                                                                                                    samples = 2
                                                                                                                         samples = 1
                                                                           samples = 3
       value = [0, 47, 0]
                            value = [0, 0, 1]
                                                 value = [0, 0, 3]
                                                                                                   value = [0, 0, 2]
                                                                                                                        value = [0, 1, 0]
                                                                          value = [0, 2, 1]
      class = versicolor
                            class = virginica
                                                                                                                       class = versicolor
                                                class = virginica
                                                                                                   class = virginica
                                                                         class = versicolor
                                                                entropy = 0.0
                                                                                     entropy = 0.0
                                                                samples = 2
                                                                                      samples = 1
                                                               value = [0, 2, 0]
                                                                                    value = [0, 0, 1]
                                                              class = versicolor
                                                                                    class = virginica
```

## **▼** C 4.5

1 import numpy as np

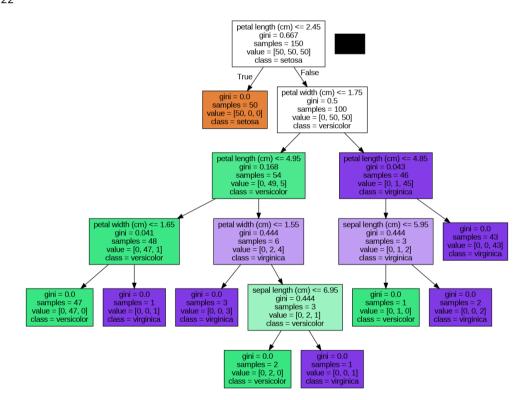
2 from sklearn.datasets import load\_iris

```
3 from sklearn.tree import DecisionTreeClassifier, export_graphviz
 4 import pydotplus
 5 from IPython.display import Image
 7 # Loading the Iris dataset
 8 iris = load_iris()
 9 X = iris.data
10 y = iris.target
11 feature_names = iris.feature_names
12 class_names = iris.target_names
13
14 # Creating a decision tree classifier using the C4.5 algorithm
15 dt = DecisionTreeClassifier(criterion='entropy')
16 dt.fit(X, y)
17
18 # Generating the decision tree visualization
19 dot_data = export_graphviz(dt, out_file=None, feature_names=feature_names, class_names=class_names, filled=True)
20 graph = pydotplus.graph_from_dot_data(dot_data)
21 Image(graph.create_png())
```

## **▼ CART ALGORITHM**

1 import numpy as np

```
2 from sklearn.datasets import load_iris
 3 from sklearn.tree import DecisionTreeClassifier, export_graphviz
 4 import pydotplus
 5 from IPython.display import Image
6
7 # Load the Iris dataset
8 iris = load_iris()
9 X = iris.data
10 y = iris.target
11 feature_names = iris.feature_names
12 class_names = iris.target_names
13
14 \# Create a decision tree classifier using the CART algorithm
15 dt = DecisionTreeClassifier(criterion='gini')
16 dt.fit(X, y)
17
18 # Generate the decision tree visualization
19 dot_data = export_graphviz(dt, out_file=None, feature_names=feature_names, class_names=class_names, filled=True)
20 graph = pydotplus.graph_from_dot_data(dot_data)
21 Image(graph.create_png())
```



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