CCPS 844 Data Mining Lab 2

Answer the following questions and submit a PDF file on the D2L.

Learning a Decision Tree for IRIS data set

In [6]:
```
from sklearn.datasets import load_iris
from sklearn import tree
from sklearn.tree import DecisionTreeClassifier
iris = load_iris()
```

Create an object named as clf of the DecisionTreeClassifier

In [7]:
```
clf = DecisionTreeClassifier()
```

In [8]:
```
clf
```

Out[8]:
```
DecisionTreeClassifier(class_weight=None, criterion='gini', max_depth=None,
                       max_features=None, max_leaf_nodes=None,
                       min_impurity_decrease=0.0, min_impurity_split=None,
                       min_samples_leaf=1, min_samples_split=2,
                       min_weight_fraction_leaf=0.0, presort=False, random_state=None,
                       splitter='best')
```

Fit the algorithm to the iris.data, iris.target by calling the fit() method with the

In [9]:
```
clf.fit(iris.data, iris.target)
```

Out[9]:
```
DecisionTreeClassifier(class_weight=None, criterion='gini', max_depth=None,
                       max_features=None, max_leaf_nodes=None,
                       min_impurity_decrease=0.0, min_impurity_split=None,
                       min_samples_leaf=1, min_samples_split=2,
                       min_weight_fraction_leaf=0.0, presort=False, random_state=None,
                       splitter='best')
```

Install the following Visualization Libraries using Anaconda Prompt

The installation commands are:

conda install -c anaconda graphviz

conda install -c anaconda python-graphviz

In [10]:
```
import graphviz
```

Exporting the Decision Tree to a PDF file

This will create a PDF file in the firectory of the file DecisionTreeVisualisation.ipynb

In [24]:
```
data = tree.export_graphviz(clf, out_file=None)
graph = graphviz.Source(data)
graph.render("iris_data")
```

Out[24]:
```
'iris_data.pdf'
```

Visualising the Decision Tree

In [27]:
```
import numpy as np
print(iris)
#removing the class variable
featureNames = np.delete(iris.target, 0)
featureNames
```

```
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```

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```

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s': array(['setosa', 'versicolor', 'virginica'], dtype='<U10'), 'DESCR': 'I
ris Plants Database\n====================\n\nNotes\n-----\nData Set Charact
eristics:\n    :Number of Instances: 150 (50 in each of three classes)\n
:Number of Attributes: 4 numeric, predictive attributes and the class\n
:Attribute Information:\n        - sepal length in cm\n        - sepal widt
h in cm\n        - petal length in cm\n        - petal width in cm\n
- class:\n                - Iris-Setosa\n                - Iris-Versicolour
\n                - Iris-Virginica\n    :Summary Statistics:\n\n    =======
======= ==== ==== ======= ===== ====================\n                    M
in  Max   Mean    SD   Class Correlation\n    ============== ==== ==== ====
=== ===== ====================\n    sepal length:   4.3  7.9   5.84   0.83
   0.7826\n    sepal width:    2.0  4.4   3.05   0.43   -0.4194\n    petal
length:   1.0  6.9   3.76   1.76    0.9490  (high!)\n    petal width:    0.
1  2.5   1.20  0.76     0.9565  (high!)\n    ============== ==== ==== =====
```

```
== ===== ====================\n\n    :Missing Attribute Values: None\n    :
Class Distribution: 33.3% for each of 3 classes.\n    :Creator: R.A. Fisher
\n    :Donor: Michael Marshall (MARSHALL%PLU@io.arc.nasa.gov)\n    :Date: J
uly, 1988\n\nThis is a copy of UCI ML iris datasets.\nhttp://archive.ics.uc
i.edu/ml/datasets/Iris\n\nThe famous Iris database, first used by Sir R.A F
isher\n\nThis is perhaps the best known database to be found in the\npatter
n recognition literature.  Fisher\'s paper is a classic in the field and\ni
s referenced frequently to this day.  (See Duda & Hart, for example.)  The
\ndata set contains 3 classes of 50 instances each, where each class refers
to a\ntype of iris plant.  One class is linearly separable from the other
2; the\nlatter are NOT linearly separable from each other.\n\nReferences\n-
---------\n   - Fisher,R.A. "The use of multiple measurements in taxonomic
problems"\n     Annual Eugenics, 7, Part II, 179-188 (1936); also in "Contr
ibutions to\n     Mathematical Statistics" (John Wiley, NY, 1950).\n   - Du
da,R.O., & Hart,P.E. (1973) Pattern Classification and Scene Analysis.\n
  (Q327.D83) John Wiley & Sons.  ISBN 0-471-22361-1.  See page 218.\n   - D
asarathy, B.V. (1980) "Nosing Around the Neighborhood: A New System\n     S
tructure and Classification Rule for Recognition in Partially Exposed\n
Environments".  IEEE Transactions on Pattern Analysis and Machine\n     Int
elligence, Vol. PAMI-2, No. 1, 67-71.\n   - Gates, G.W. (1972) "The Reduced
Nearest Neighbor Rule".  IEEE Transactions\n     on Information Theory, May
1972, 431-433.\n   - See also: 1988 MLC Proceedings, 54-64.  Cheeseman et a
l"s AUTOCLASS II\n     conceptual clustering system finds 3 classes in the
data.\n   - Many, many more ...\n', 'feature_names': ['sepal length (cm)',
'sepal width (cm)', 'petal length (cm)', 'petal width (cm)']}
```

Out[27]:
```
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       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2])
```

In [29]:
```
data = tree.export_graphviz(clf, out_file=None,
                            feature_names=iris.feature_names,
                            class_names=iris.target_names,
                            filled=True, rounded=True,
                            special_characters=False)
graph = graphviz.Source(data)
graph
```

Out[29]: