Today Agenda
- Introduction to Decision Tree
- Algorithm with one dataset

In [1]:

```
# 1. read the data
import pandas as pd
from sklearn.datasets import load_iris
iris_data = load_iris()
iris_data
```

```
C:\Users\RANGA\Anaconda3\lib\importlib\_bootstrap.py:219: RuntimeWarning: nu
mpy.ufunc size changed, may indicate binary incompatibility. Expected 192 fr
om C header, got 216 from PyObject
  return f(*args, **kwds)
C:\Users\RANGA\Anaconda3\lib\importlib\_bootstrap.py:219: RuntimeWarning: nu
mpy.ufunc size changed, may indicate binary incompatibility. Expected 192 fr
om C header, got 216 from PyObject
  return f(*args, **kwds)
```

Out[1]:

```
{'data': array([[5.1, 3.5, 1.4, 0.2],
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```

```
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 'target_names': array(['setosa', 'versicolor', 'virginica'], dtype='<U10'),
 'DESCR': '.. _iris_dataset:\n\nIris plants dataset\n--------------------\n
\n**Data Set Characteristics:**\n\n    :Number of Instances: 150 (50 in each
of three classes)\n    :Number of Attributes: 4 numeric, predictive attribut
es and the class\n    :Attribute Information:\n        - sepal length in cm
\n        - sepal width in cm\n        - petal length in cm\n        - petal
```

width in cm\n   - class:\n   - Iris-Setosa\n
- Iris-Versicolour\n   - Iris-Virginica\n   \n
:Summary Statistics:\n\n   ============== ==== ==== ======= ===== =========
===========\n   Min Max   Mean   SD   Class Correlation\n
============== ==== ==== ======= ===== ====================\n   sepal lengt
h: 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 (hig
h!)\n   petal width: 0.1 2.5   1.20   0.76   0.9565 (high!)\n   ====
========== ==== ==== ======= ===== ====================\n\n   :Missing Attr
ibute 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.nas
a.gov)\n   :Date: July, 1988\n\nThe famous Iris database, first used by Sir
R.A. Fisher. The dataset is taken\nfrom Fisher\'s paper. Note that it\'s the
same as in R, but not as in the UCI\nMachine Learning Repository, which has
two wrong data points.\n\nThis is perhaps the best known database to be foun
d in the\npattern recognition literature. Fisher\'s paper is a classic in t
he field and\nis referenced frequently to this day. (See Duda & Hart, for e
xample.) 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\n.. t
opic:: References\n\n   - Fisher, R.A. "The use of multiple measurements in
taxonomic problems"\n   Annual Eugenics, 7, Part II, 179-188 (1936); also
in "Contributions to\n   Mathematical Statistics" (John Wiley, NY, 195
0).\n   - Duda, R.O., & Hart, P.E. (1973) Pattern Classification and Scene A
nalysis.\n   (Q327.D83) John Wiley & Sons. ISBN 0-471-22361-1. See page
218.\n   - Dasarathy, B.V. (1980) "Nosing Around the Neighborhood: A New Sys
tem\n   Structure and Classification Rule for Recognition in Partially Exp
osed\n   Environments". IEEE Transactions on Pattern Analysis and Machine
\n   Intelligence, Vol. PAMI-2, No. 1, 67-71.\n   - Gates, G.W. (1972) "Th
e Reduced Nearest Neighbor Rule". IEEE Transactions\n   on Information Th
eory, May 1972, 431-433.\n   - See also: 1988 MLC Proceedings, 54-64. Chees
eman et al"s AUTOCLASS II\n   conceptual clustering system finds 3 classes
in the data.\n   - Many, many more ...',
 'feature_names': ['sepal length (cm)',
  'sepal width (cm)',
  'petal length (cm)',
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 'filename': 'C:\\Users\\RANGA\\Anaconda3\\lib\\site-packages\\sklearn\\data
sets\\data\\iris.csv'}

In [4]:

```
# 2.Check the null values
#3.Seperate the input and output labels
x = iris_data.data
# x = iris_data['data']
x
```

Out[4]:

```
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       [5.4, 3.9, 1.7, 0.4],
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       [7. , 3.2, 4.7, 1.4],
```

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       [5.9, 3. , 5.1, 1.8]])
```

In [5]:

```
1 y = iris_data['target']
2 y
```

Out[5]:

```
array([0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
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```

In [6]:

```
# 4.Seperate the data into train and test data
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y,
                                                 test_size=0.25,
                                                 random_state=1)

```

In [9]:

```
from sklearn.tree import DecisionTreeClassifier
tree = DecisionTreeClassifier()
```

In [10]:

```
# 5. train the model by using fit method
tree.fit(x_train,y_train)
```

Out[10]:

```
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')
```

1.graphviz --> it is used to download and display the tree in our jupyter notebook and our local system
2.pydotplus --> it is used for drawing the graph with dot extension

.dot --> it is the extension of our tree from decision tree

graphviz
---
pip install graphviz

pip install pydotplus

In [11]:

```
# it is used for downloading the tree into our local system
from sklearn.tree import export_graphviz
export_graphviz(tree,out_file='iris_tree.dot',
                filled = True,
                rounded = True,
                feature_names = iris_data.feature_names,
                class_names = iris_data.target_names)
```

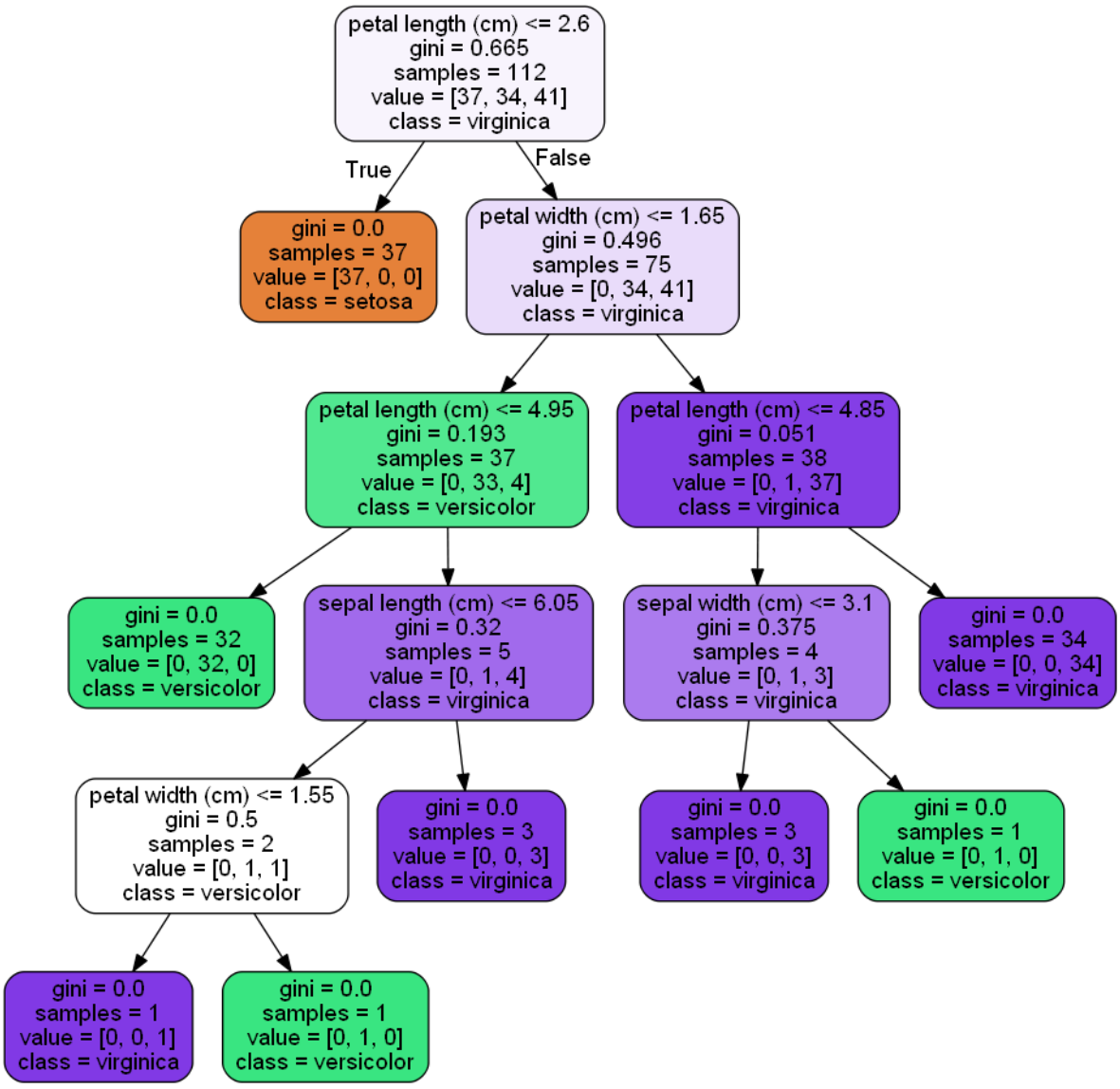
In [16]:

```
from sklearn.externals.six import StringIO
from IPython.display import Image
import pydotplus
sio = StringIO()
export_graphviz(tree,out_file = sio,
                filled = True,
                rounded= True,
               feature_names=iris_data.feature_names,
               class_names=iris_data.target_names)
pplot = pydotplus.graph_from_dot_data(sio.getvalue())
```

In [17]:

```
Image(pplot.create_png())
```

Out[17]:



In [ ]:

```

```