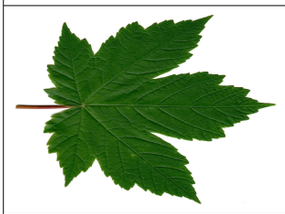
ARTIFICIAL INTELLIGENCE: Understanding Data

STUDENT REGISTRATION ID (NRP): _____
NAME: _____
CLASS: _____

Picture	Attribute	Species
	Width : 4.0 cm Height: 2.5 cm Width/Height: ____	A
	Width : 4.0 cm Height: 3.5 cm Width/Height: ____	B
	Width: 2.8 cm Height: 1.5 cm Width/Height: ____	A
	Width: 3.5 cm Height: 1.8 cm Width/Height: ____	A
	Width: 5.1 cm Height: 4.9 cm Width/Height: ____	B
	Width: 2.0 cm Height: 2.1 cm Width/Height: ____	B

ACTIVITY: Plot the data above based on these features

Width	Height	Width vs Height	Width/Height

ARTIFICIAL INTELLIGENCE: Linear Regression

STUDENT REGISTRATION ID (NRP): _____
NAME: _____
CLASS: _____

ACTIVITY

1. Try to guess the value of x
   * [1,2], [2,3], [3,4], [4,x]
   * [1,1], [2,4], [3,9], [4,x]

2. Install this app on your phone: https://play.google.com/store/apps/details?id=com.successcrazzy.datascience101 (You can use `Data Science 101` as keyword)

3. Read the `Linear Regression` section

4. Try to guess the value of x
   * [2,10], [4,9], [3,6], [6,6], [8,6], [8,3], [10,2], [12, x]

5. Try to make a program by using scikit-learn (http://scikit-learn.org/stable/modules/generated/sklearn.linear_model.LinearRegression.html) to do the 4th task.

ARTIFICIAL INTELLIGENCE: Decision Tree

STUDENT REGISTRATION ID (NRP): _____
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CLASS: _____

ACTIVITY

1. Install this app on your phone: https://play.google.com/store/apps/details?id=com.successcrazzy.datascience101 (You can use `Data Science 101` as keyword)

2. Read the `Decision Tree` section

3. How to calculate Information, Entropy, and Gain?

4. Consider the following dataset, determine the choice for the last data

Size	Shape	Color	Choice
M	Brick	Blue	Yes
S	Wedge	Red	No
L	Wedge	Red	No
S	Sphere	Red	Yes
L	Pillar	Green	Yes
L	Pillar	Red	No
L	Sphere	Green	Yes
M	Pillar	Green	?

5. Build a decision tree program for the case above by using scikit-learn (http://scikit-learn.org/stable/modules/tree.html)

6. Consider this ruleset:
   * finalScore = 0.2 * assignment + 0.3 * midTest + 0.5 * finalTest
   * if finalScore >= 80, then finalMark = A
   * if finalScore < 80 and finalScore >= 70, then finalMark = B
   * if finalScore < 70 and finalScore >= 60, then finalMark = C
   * if finalScore < 60 and finalScore >= 40, then finalMark = D
   * if finalScore < 40, then finalMark = E

   You can collect the student data and build a decision tree to determine the finalMark.
   Do you think that using the decision tree to determine the finalMark is a good decision? Why? Or why not?

ARTIFICIAL INTELLIGENCE: Naive Bayes

STUDENT REGISTRATION ID (NRP): _____
NAME: _____
CLASS: _____

ACTIVITY

1. Install this app on your phone: https://play.google.com/store/apps/details?id=com.successcrazzy.datascience101 (You can use `Data Science 101` as keyword)

2. Read the `Naive Bayes` section

4. Consider the following dataset, determine the attribute for the stolen attribute of the last data

Color	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	SUV	Imported	No
Yellow	Sports	Imported	Yes
Yellow	SUV	Imported	Yes
Red	Sports	Imported	Yes
Yellow	SUV	Domestic	?

5. Build a naive-bayes classifier by using scikit-learn (http://scikit-learn.org/stable/modules/tree.html)

ARTIFICIAL INTELLIGENCE: KNN & K-Means

STUDENT REGISTRATION ID (NRP): _____
NAME: _____
CLASS: _____

ACTIVITY

1. Install this app on your phone: https://play.google.com/store/apps/details?id=com.successcrazzy.datascience101 (You can use `Data Science 101` as keyword)

2. Read the `KNN` and `K-Means` section

3. Read the following data

Width	Height	Species
6	7	A
6	8	A
7	6	A
3	2	B
2	3	B
3	3	B
9	8	C
10	9	C
9	9	C
6	9	?

4. Using KNN with K = 3, find out the species of the last row
5. Using KNN with K = 6, find out the species of the last row
6. What is the advantages and disadvantages of KNN?

7. Using K-Means, what K should be?
8. Find out the centroid of each cluster
9. Using K-Means, determine the species of the last row
10. What is the advantages and disadvantages of K-Means?

ARTIFICIAL INTELLIGENCE: ANN

STUDENT REGISTRATION ID (NRP): _____
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CLASS: _____

ACTIVITY

1. Read this article: https://medium.com/technology-invention-and-more/how-to-build-a-simple-neural-network-in-9-lines-of-python-code-cc8f23647ca1

2. Try to run this program:

```
from numpy import exp, array, random, dot
training_set_inputs = array([[0, 0, 1], [1, 1, 1], [1, 0, 1], [0, 1, 1]])
training_set_outputs = array([[0, 1, 1, 0]]).T
random.seed(1)
synaptic_weights = 2 * random.random((3, 1)) - 1
for iteration in xrange(10000):
    output = 1 / (1 + exp(-(dot(training_set_inputs, synaptic_weights))))
    synaptic_weights += dot(training_set_inputs.T, (training_set_outputs - output)
* output * (1 - output))
print 1 / (1 + exp(-(dot(array([1, 0, 0]), synaptic_weights))))
```

3. How to calculate neuron's output?
4. How to calculate weight's change?
5. How neural network compared to Decision Tree / Naive Bayes / KNN / K-Means