CSC 535/635 – HW 4

Perceptron Implementation

**Instructions:** Students are required to work alone on this assignment.

For this assignment, you will **implement** the Perceptron algorithm as given on Module 10’s PowerPoint slides on Blackboard. Assume that there are two classes labeled 1 and -1. Use the training data provided in the file training\_data.txt. Use the testing data provided in the file testing\_data.txt. The third attribute in the datasets is the class label. Use a threshold activation function, which will work fine for linearly separable datasets.

For each test object, output the object followed by the actual class label followed by the predicted class label. This will be followed by the output of the overall accuracy rate, followed by the learned parameters (weights and bias.) Sample program output is as follows:

[ 5.32 0.37] Actual label: 1 Predicted label: 1  
[-4.06 -6.25] Actual label: 1 Predicted label: 1  
[-1.17 -6.83] Actual label: 1 Predicted label: 1  
[ 7.6 -4.52] Actual label: 1 Predicted label: 1  
[-1.72 -4.08] Actual label: 1 Predicted label: 1  
[ 2.58 1.6 ] Actual label: 1 Predicted label: 1  
[ 2. -4.68] Actual label: 1 Predicted label: 1  
[-4.31 -4.93] Actual label: 1 Predicted label: 1  
[-3.45 -7.12] Actual label: 1 Predicted label: 1  
[ 9.2 -6.23] Actual label: 1 Predicted label: 1  
[-5.56 7.41] Actual label: -1 Predicted label: -1  
[-5.87 8.37] Actual label: -1 Predicted label: -1  
[-0.23 2.23] Actual label: -1 Predicted label: -1  
[-8.39 4.77] Actual label: -1 Predicted label: -1  
[-6.69 9.28] Actual label: -1 Predicted label: -1  
[-9.51 -5.91] Actual label: -1 Predicted label: -1  
[ 4. 5.59] Actual label: -1 Predicted label: -1  
[-9.54 1.55] Actual label: -1 Predicted label: -1  
[-9.97 0.31] Actual label: -1 Predicted label: -1  
[ 2.8 9.71] Actual label: -1 Predicted label: -1

Accuracy rate: 100.00%

Learned weights are: [ 5.23962701 -5.18962127]  
Learned bias: 0.405526752143

# **What to turn in?**

Name your file that you will upload to Blackboard hw4\_YourFirstName\_YourLastName.py or hw4\_YourFirstName\_YourLastName.ipynb as appropriate. For example, if a student’s name is John Doe, the file will be named hw4\_John\_Doe.py or hw4\_John\_Doe.ipynp. **Please make sure that your code is well organized and properly documented and commented.** Seed the random number generator so that we get the same results when we test your code. Many points can be deducted for code that is not properly commented or is hard to understand.

At the top of your file, in a docstring or as a markdown cell, write down the following information:

* Your name
* The stopping criteria you used for your implementation of the perceptron algorithm
* The accuracy you got on the testing data
* Any comments about this homework assignment that you may want to share