

## Machine Learning: Programming Assignment 6: Perceptron Learning

### *Problem Statement:*

Write a program to train a *single* perceptron using the delta learning rule. Consider learning rate to be 0.1. (You may also try to find out a better learning rate by trial.) Randomly initialize the weights of the perceptron. Train the perceptron for 10 epochs. Then, the learned classifier should be tested on test instances with unknown class labels, and the predicted class labels for the test instances should be printed as output.

### *Data Set Description:*

Training Data Filename: *data6.csv*

Training Data File Format: Boolean input attributes ( $x_1, x_2, \dots, x_8$ ) in first 8 columns. The last (9<sup>th</sup>) column represents the Boolean class label ( $y$ ). Each row is a training instance. There are 20 training instances.

Test Data Filename: *test6.csv*

Test Data File Format: Boolean input attributes ( $x_1, x_2, \dots, x_8$ ) in each of the 8 columns. Note that, there is no class label column. Each row is a test instance. There are 4 test instances. The row number corresponds to the instance number of the test instances.

Please STRICTLY follow the program input/output format specified below.

Input Format: Assume the data files *data6.csv* and *test6.csv* is present in the same directory and contains the training and test data. Thus, your program should not require any input from user and should read from these files. Strictly use these filenames only.

Output Format: Predicted class labels (0/1) for the test data exactly in the order in which the test instances are present in the test file. Put a blank space between printed the class labels. (e.g., output 0 0 1 1, if the predicted class labels are - Test Instance 1: 0, Test Instance 2: 0, Test Instance 3: 1, Test Instance 4: 1). Output, in above format, should be printed to the file: *rollnumber\_6.out* (e.g., *14CS10001\_6.out*). Strictly use this filename format.

### *Submission Guidelines:*

You may use one of the following languages: c/C++/Java/Python. You should name your file as *<rollnumber\_6.extension>* (e.g., *14CS10001\_6.c*). Your program should be standalone and should not use any *special purpose* library. numpy may be used. You should submit the program file only and not the output/input file. The submitted single program file *should* have the following header comments:

```
# Roll          # Name          # Assignment number          # Specific compilation/execution flags (if required)
```

*Please submit the program in moodle by **October 31, 2018 midnight** (hard deadline). Copying from friends/web will lead to strict penalties.*