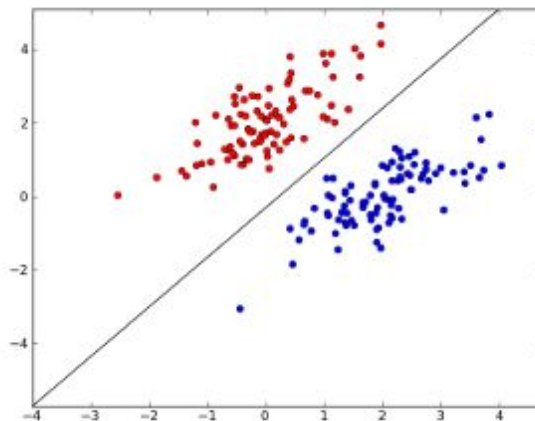


Lab 6: Classification using perceptron

A security researcher wanted to see if they could figure out the password entered in a smart-phone just by looking at the accelerometer data from the phone. They expect that pressing the phone in different positions (corresponding to pressing different numbers on the screen) would cause different signals on the accelerometer. The team gathered training data, where each data point is the x,y values sensed by the accelerometer and the label is the number pressed. Your job is to build a classifier using a perceptron that can classify the button pressed by looking at just the accelerometer data.

Problem 1:

To verify you can build a classifier, the researcher asked that you first build a binary classifier that can classify 2D data that is linearly separable. To complete this task you are to make a function that takes in some labeled training data (data is x,y values and each data is labeled as class 0 or 1), and your function is to classify the test data given. The team wants your classifier to be correct more than 95% of the time.



For this part you are to complete one function:

- For C:

```
void part_one_classifier(float **data_train,float **data_test)
```
- For python:

```
def part_one_classifier(data_train,data_test):
```

The function receives:

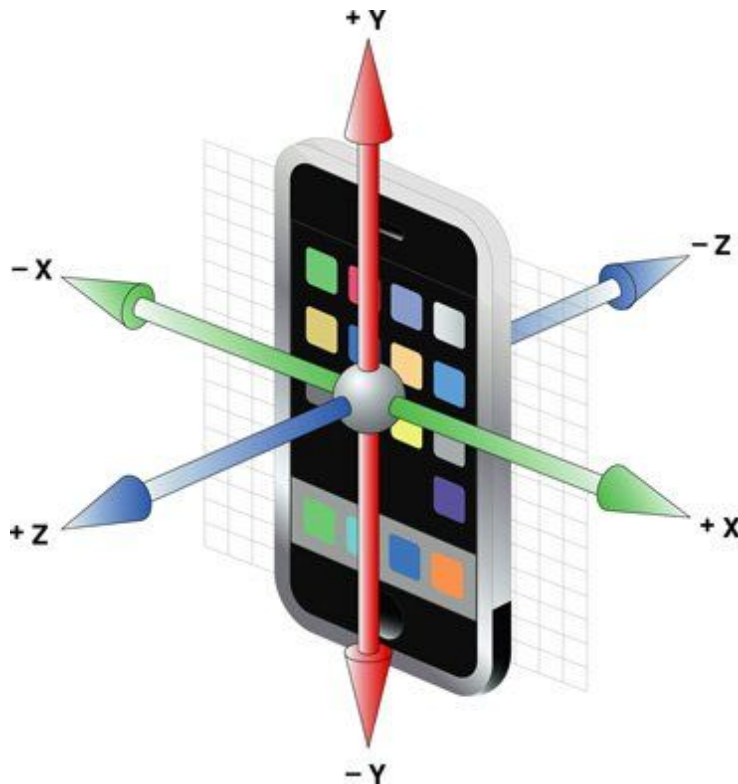
- bidimensional structure `data_train` of size `TRAINING_SIZE x 3`. Every row contains a value for X in position 0, a value for Y in position 1 and a value for the class in position 2.
- bidimensional structure `data_test` of size `TEST_SIZE x 3`. Every row contains a value for X in position 0, a value for Y in position 1 and an empty space for the class in position 2.

The function must modify:

-The third column of the “data_test ” structure, by entering the right class of each element. Valid values for classes are 0 or 1.

Problem 2:

Now the researcher give you the training data collected from the phone, which for each data point it is the x,y accelerometer values, and the button pressed (0-8). Next they give you test data, just the x,y accelerometer values sensed when a button was pressed. You are to write a function that takes in the training data and test data, and correctly classifies the test data. The researcher wants your classifier to be correct more than 90% of the time.



For this part you are to complete one function:

- For C

```
void part_two_classifier(float **data_train,float **data_test)
```
- For python

```
def part_two_classifier(data_train,data_test):
```

The function receives:

- bidimensional structure data_train of size TRAINING_SIZE x 3. Every row contains a value for X in position 0, a value for for Y in position 1 and a value for the class in position 2.
- bidimensional structure data_test of size TEST_SIZE x 3. Every row contains a value for X in position 0, a value for for Y in position 1 and an empty space for the class in position 2.

The function must modify:

-The third column of the “data_test ” structure, by entering the right class of each element. Valid values for classes are 0 to 8.

Instructions:

1. Login to your server
2. Go to the EECS348_Labs directory
`$ cd EECS348_Labs`
3. Download the Lab code:
`$./getLab Lab6 <language>`
Fetching Lab6 code
Unpacking code
done!
4. Edit student_code file:
`$ nano Labs/Lab6/src/student_code.c`
5. Test the Lab:
`$./testLab Lab6`
<All Test Results Successful>
6. Submit your code:
`$./submitLab Lab6`
Creating submission file
Uploading file
Submission finished

