CLL 788 Assignment 2 Report

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1. A university conducts 2 exams – Aptitude & Verbal as its entrance test to a 2- year program. Based on the scores of these 2 papers, admission is given to students. University has not mentioned the exact criteria of selection. Based on historical data, you need to predict whether a student will get admission based on his/her scores in the 2 exams. Data is provided in q1train.csv & q1test.csv. Train.csv contains training data. First column contains the score of Aptitude exam, 2nd column contains the score of verbal exam and 3rd column indicates whether that student got admission or not. 0 indicates not selected whereas 1 means selected. q1test.csv contains test data.

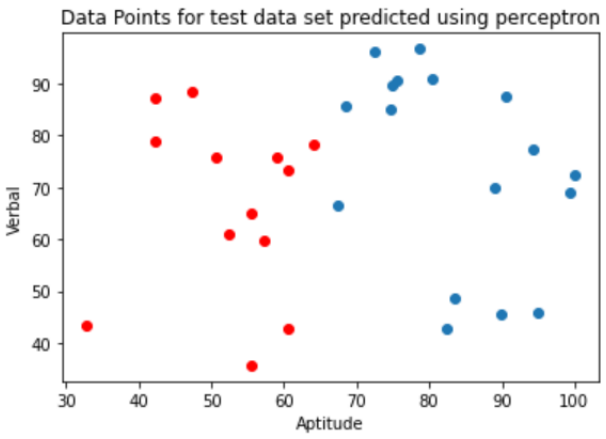
A) Apply perceptron on training data with the first 2 columns as input data and the third column as output. Use any suitable learning rate.

Developed code for perceptron after checking for various values of learning rate (alpha) the value which gave the best accuracy was for **alpha=0.0175** total number of iterations used were **10000** and to check the accuracy of my model, I divided my training dataset into train (70%) and test (30%) and fitted the model with the train dataset and got an **90%** accuracy for the test dataset. In order to get better accuracy I used scaling to normalise aptitude and verbal columns of both the training and testing dataset
On finalising the value of learning rate and the iterations, I fitted the perceptron model with the entire training dataset.

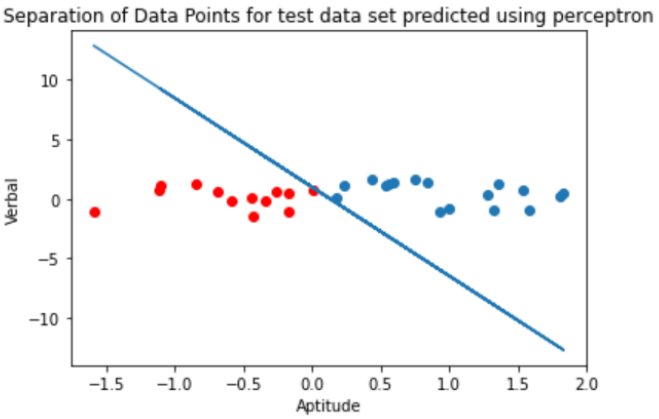
B) Now predict admission results on test data (Test.csv) and print the result in output1.txt with every line of the text file containing either 0 or 1. Plot the results like in step 1.

Using the fitted model in part A, i predicted the labels for test data set and stored it in output1.txt file.

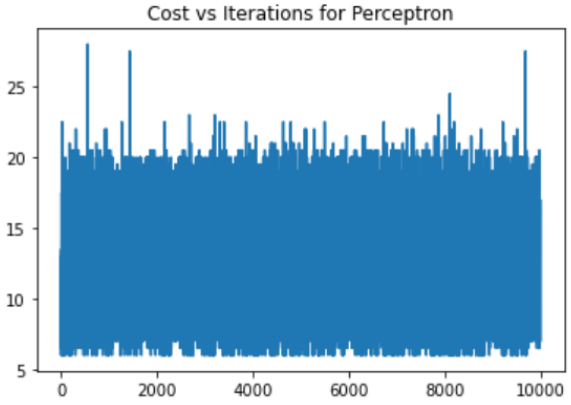
Plots



The above plot shows the test data points (red points are the points with labels as 0 while blue are points with label 1)



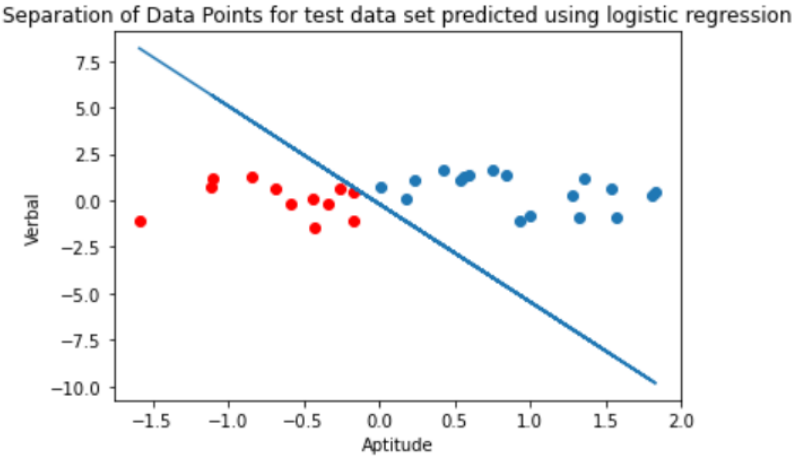
The above plot shows data points of test set (normalised) plotted versus the projected line of perceptron function separating the classes 0 & 1.

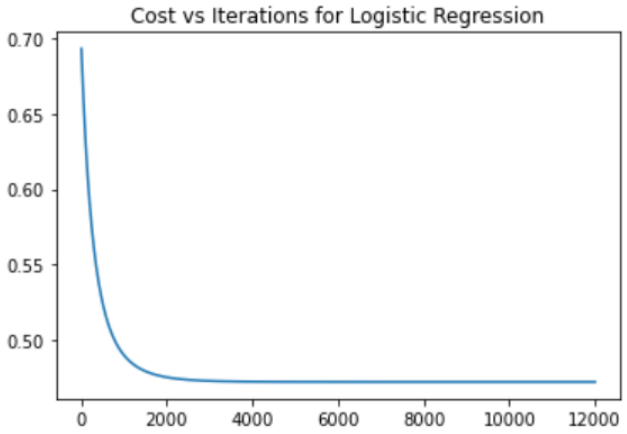


The above plot shows the variation of cost with iterations we can observe unlike in logistic regression, the cost does not seem to converge. The reason is because here we are using activation functions and not minimizing costs, the cost would converge once we add more layers to the perceptron there gradient descent functions are used.

C) Compare the results with the logistic regression. (Assignment 1).

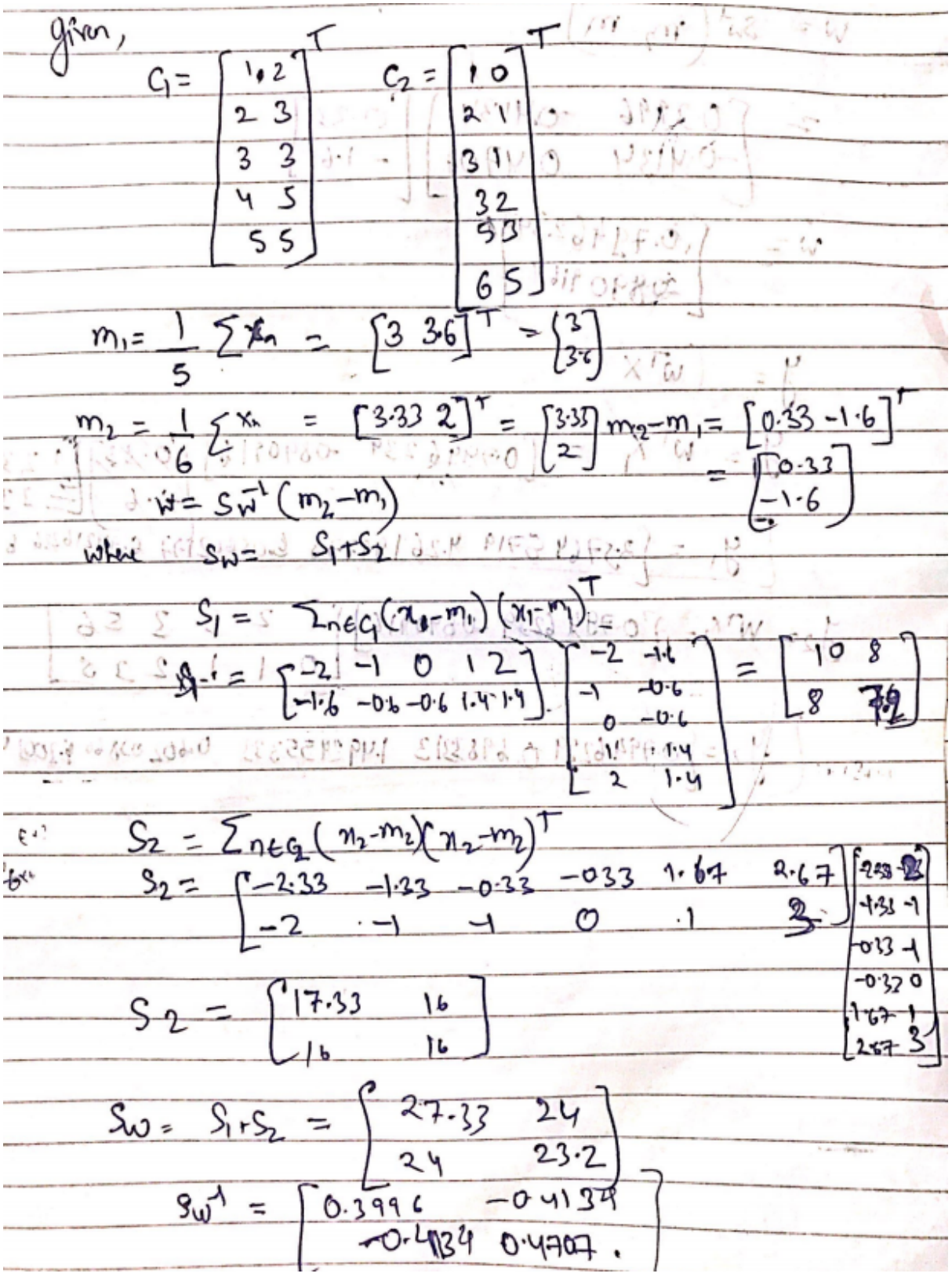
I compared my obtained labels for the test dataset using perceptron algorithm with the ones predicted using logistic regression. And after comparing **29 out of 30** labels matched

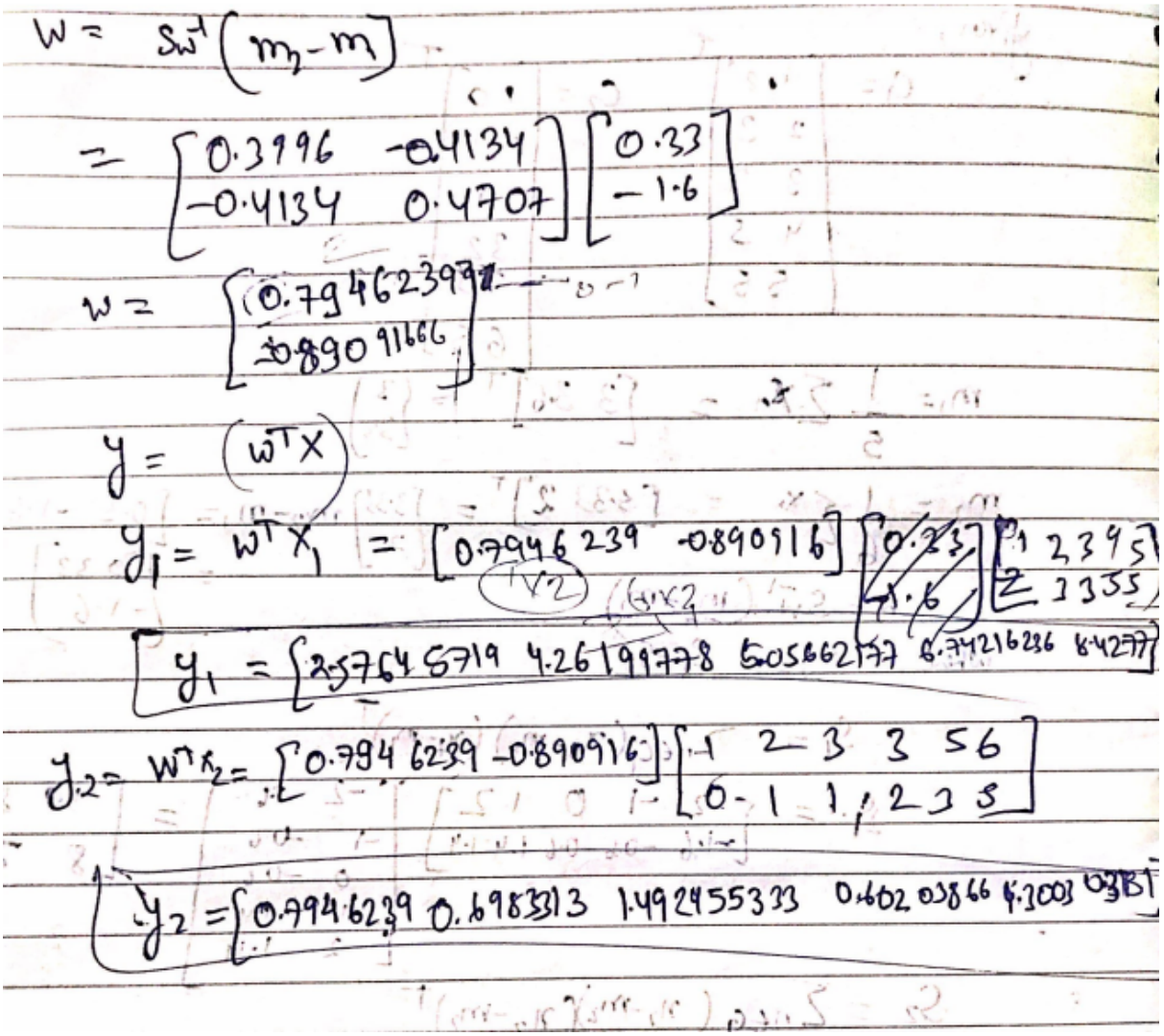




The above are the similar plots for logistic regression as in part B for perceptron notice the cost here is converging unlike that in perceptron.

2. Let class 1 have the 5 samples c1 = [(1,2),(2,3),(3,3)(4,5),(5,5)] and let class 2 have 6 samples: c2 = [(1,0),(2,1),(3,1),(3,2),(5,3),(6,5)]. Using discriminant analysis find projections y1 & y2 respectively for c1 & c2.





The final obtained values are
y1 = [2.57645719 4.26199778 5.05662177 6.74216236 8.4277]
y2 = [0.9946239 0.6983313 1.4924553 0.6020386 4.3003 0.3131]