MLBP 2019 - Quiz 3
27/09/2019 - 07/10/2019 at 23:59

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(1) (3.0 pt.) Use perceptron algorithm for the following data and consider a case where we know the separator line should cross the origin (no bias or intercept). Compute the weights at convergence (when the algorithm finishes), assuming that in perceptron algorithm each time we update the weights using the misclassified example with minimum index in the given data. Consider weights are initialized with a zero vector.
You need to either implement or find an implementation to answer this question.
Hint: for updating the weights take the example that has been misclassfied and comes earlier in the data (if there are more than one).
$X = [[0.8, 0.1], [0.7, 0.2], [0.9, 0.3], [0.3, 0.8], [0.1, 0.7], [0.1, 0.9]]$
$Y = [-1, -1, -1, 1, 1, 1]$
1- [-0.5, 0.7]
2- [-0.8, -0.1]
3- [-0.4, 0.3]

(2) (4.0 pt.) In the previous question, add an example [0.4,0.4] with label "-1", to the end of the data and consider this time the bias term as well (the separator might not cross the origin). what is the number of true positives in the last three iterations.
Note: the same as the previous question, each time we update the weights using the misclassified example with minimum index in the given data and weights are initialized with a zero vector.
You need to either implement or find an implementation to answer this question.
1- 3,2,3
2- 2,3,3
3- 1,3,3

(3) (5.0 pt.) Using logistic regression (lecture 6) for the previous data in question 2, which option represents the number of true positives if we change the decision threshold of the logistic function from 0.5 to 0.3 and 0.8 (slide 7 lecture 6):
Note1: consider learning rate 0.01
Note2: Stopping criterion : algorithm should run 1000 iterations and do not check on the change of the cost function for the stopping criterion
You need to either implement (slide 4 and 23 of lecture 6) or find an implementation to answer this question.
Hint1: Compute logistic regression coefficients for the given data and for the prediction phase, change the decision threshold from 0.5 (standard decision threshold) to 0.3 and 0.8. Find TP (true positives) for each threshold and then see which of the following options is correct
Hint2: $(TP_{0.5}, TP_{0.3}, TP_{0.8})$
1- (3,3,0)
2- (3,2,0)
3- (3,0,2)