

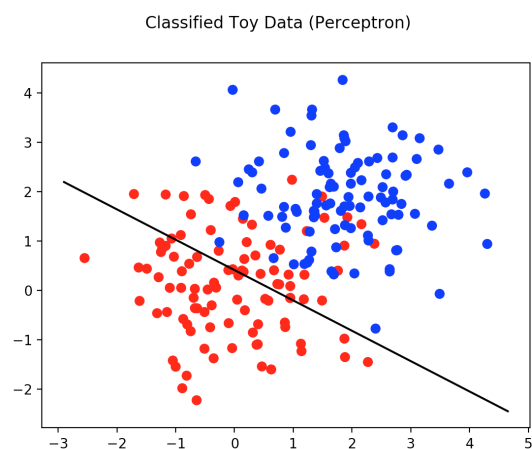
Project 1Collaborators: *Fernie Ortiz, Alec Kushner***Problem 1**

Figure 1: Perceptron

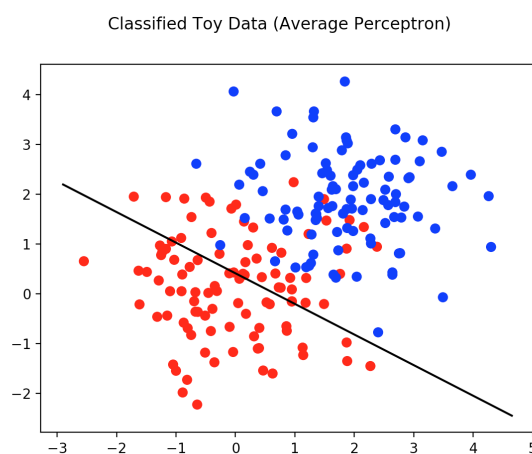


Figure 2: Average Perceptron

Part 7) The perceptron, average perceptron, and Pegasos algorithms yield different decision boundaries because the method of updating the parameters is different for each of them.

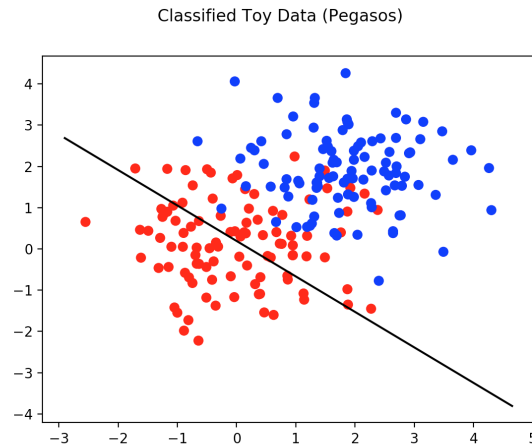


Figure 3: Pegasos

The perceptron algorithm simply goes through the training set T times, adjusting the parameters slightly in response to any mistake.

The average perceptron algorithm tracks the parameters as the algorithm runs and takes the average. In other words, it averages parameters that are present at each step, not just parameters after each update, so as to emphasize parameters that seem to work better than others.

The pegasos algorithm uses stochastic gradient descent.

Problem 2

Part 9-b) Training accuracy for perceptron: 0.9593

Validation accuracy for perceptron: 0.8240

Training accuracy for average perceptron: 0.9593

Validation accuracy for average perceptron: 0.8240

Training accuracy for Pegasos: 0.8662

Validation accuracy for Pegasos: 0.7920

Part 10-a) The values do not seem to behave similarly. Training accuracy and validation accuracy tend not to behave similarly because the validation accuracy tends to peak and then diminish.

Part 10-b) Average Perceptron**Part 10-c)** Perceptron: $T = 50$ Average Perceptron: $T = 25$ Pegasos: $T = 50$, $\lambda = 0.01$ **Part 11-a)** (0.9875000000000004, 0.7780000000000002)**Part 11-b)** ['perfect', 'love', 'best', 'delicious', '!', 'more', 'great', 'works', 'wonderful', 'nice']**Part 12)** New Accuracy: (0.9992499999999997, 0.7800000000000003)

To improve performance, I modified the bag of words function by creating a better list of stop words. Originally, there were words that I judged to be ranked too high because they did not seem explanatory in nature.

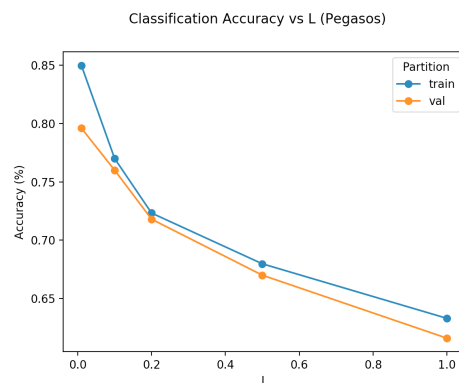


Figure 4: Average Perceptron L

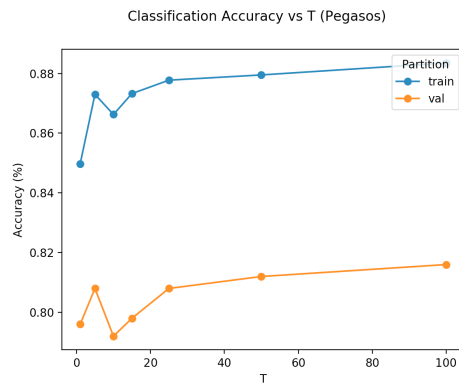


Figure 5: Pegasos

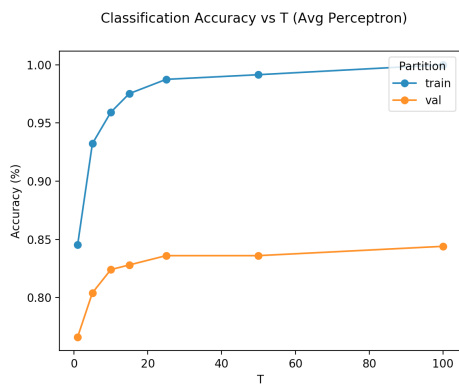


Figure 6: Average Perceptron T

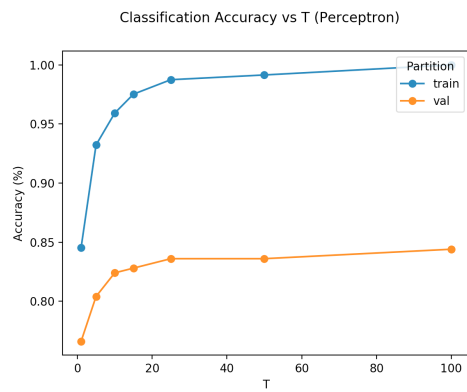


Figure 7: Perceptron