

A6 Report

Name: [Aaron Hong](#)

Assignment 6: Perceptron Classification and Training

CSE 415 Introduction to Artificial Intelligence, Autumn 2023, University of Washington

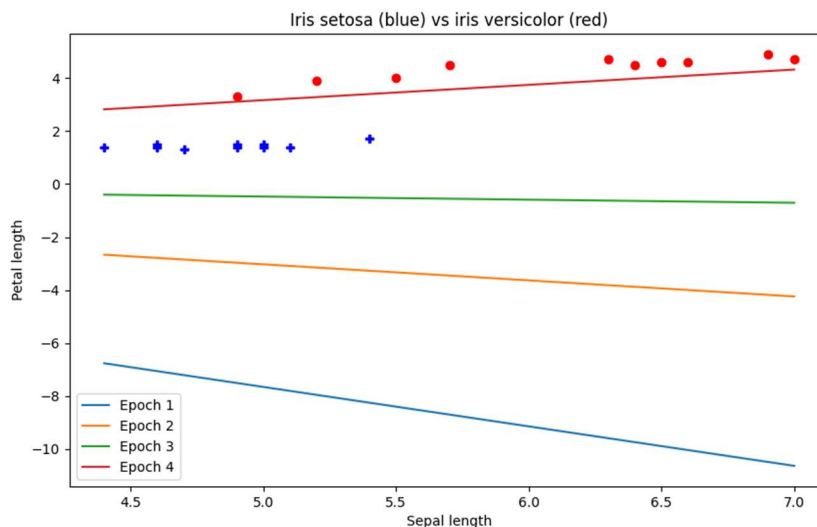
Please answer each question using text in [Blue](#), so your answers stand out from the questions.

Note: If not otherwise specified, use the default parameters present in the starter code to answer the questions.

Q1. How many epochs were required to train your perceptron on the 2-class Iris data having 2 features? What was the performance of your perceptron on the test data?

It took 4 epochs to train my perceptron. After 4 epochs, the data was divided correctly.

Q2. Include a graphic produced using matplotlib that shows both the training data points (in separate colors) and the “separating” lines implied by the weights at the end of each training epoch.” (Reduce the graphic as necessary to make it fit here without taking up more than half the page.)



Q3. In the above plot, was there any thrashing (oscillation in the separator, such as flipping slope back and forth between positive and negative values, or having its y intercept jumping up and down as epochs proceed? How would you describe the progress of the learning, on the basis of the plot?

No, there was no thrashing. Learning was consistent from epoch to epoch, consistently getting closer.

Q4. After plotting the ring data, describe its distribution in words.

One type of data surrounded the other like a ring.

Q5. Describe the sequence of separators obtained when training your perceptron for 25 epochs using the ring data. Is there any thrashing? To what extent did it achieve convergence? And finally, do you think if the model is run for more epochs it will eventually fully converge?

No thrashing, and it did not converge. The model will never converge because the data is not linearly separable.

Q6. After you have re-mapped the ring data with the provided non-linear mapping function, plot the data and describe the distribution.

The data is now linearly separable.

Q7. After training your perceptron on the re-mapped ring data, did it achieve convergence, and if so, how many epochs were used?

The perceptron converged after 9 epochs.

Q8. What do these results suggest about the power of perceptrons to classify data that may consist of clusters that cannot be separated by a linear manifold (such as a line or plane)?

Perceptrons can still classify data that is not linearly separable as long as the data can be made linearly separable with a remapping function.