

A6 Report

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Assignment 6: Perceptron Classification and Training

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

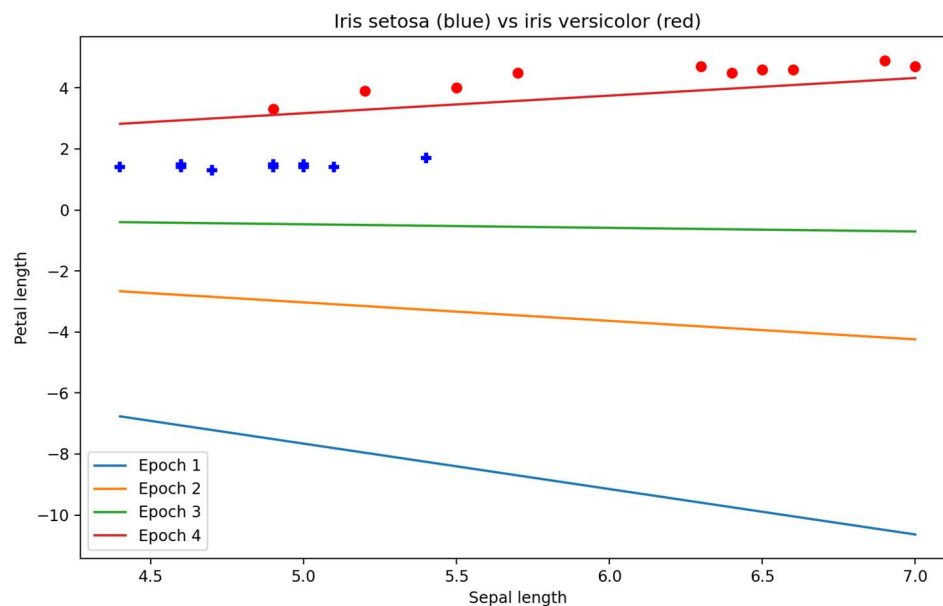
Please answer each question using text in **Blue**, so your answers stand out from the questions.

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?

4 epochs were required for training. 2 errors on the test data, out of 80 items.

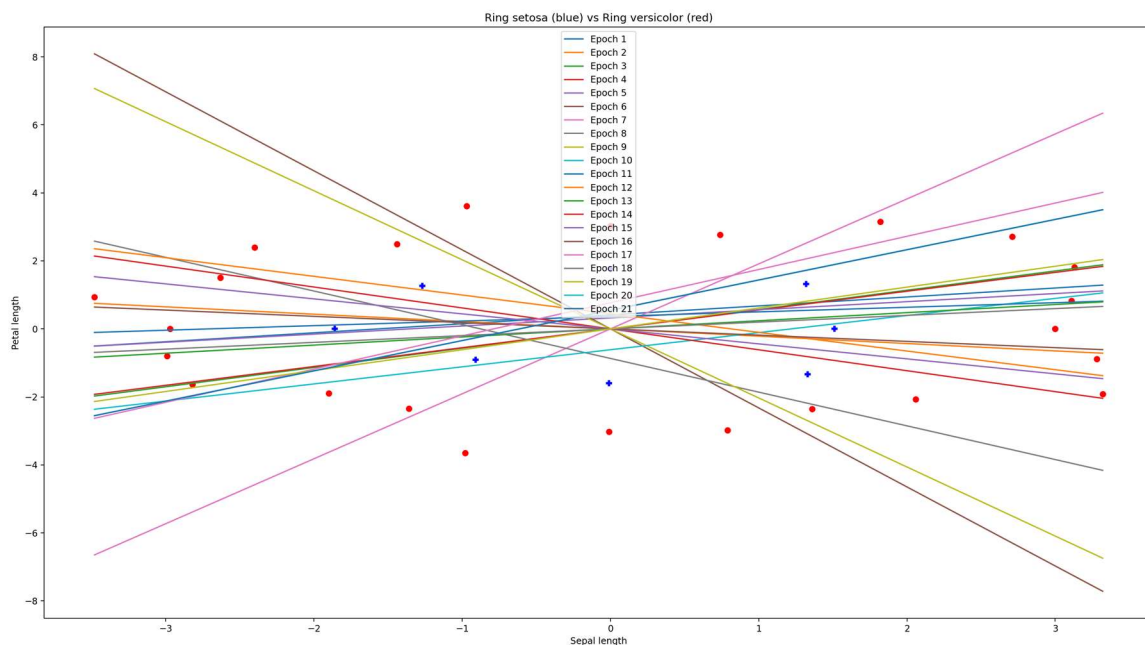
Q2. Include a graphic produced using matplotlib that shows both the training data points (in separate colors) and the “separating” lines implied by the weights at the end of each training epoch.” (Reduce the graphic as necessary to make it fit here without taking up more than half the page.)



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 oscillation in the graph. The progress of the learning converges gradually.

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



The distribution is presented in a shape of concentric circle.

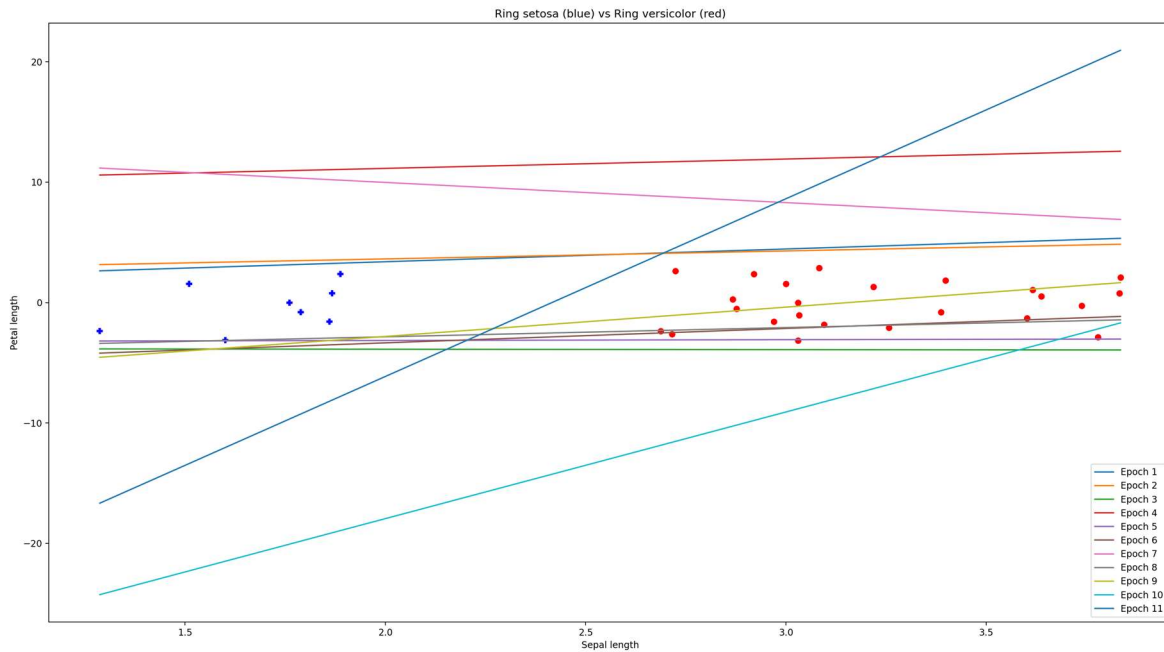
Q5. Describe the sequence of separators obtained when training your perceptron for 25 epochs using the ring data. Is there any thrashing? To what extent did it achieve convergence? And finally, do you think if the model is run for more epochs it will eventually fully converge?

Yes, there is thrashing.

It does not converge.

The model does not show a hint of convergence; hence I am guessing that it will never converge.

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



Positive values are on one side; negative values are on the other side.

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

Yes, it does. Converged in 11 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)?

This method of classifying data may not be applicable to all data (Q4. Result) but it provides a visualization of how data distribution is. If we apply coordinate transformation such as remapped in Q6., the perceptrons method can still be helpful.