ECE 592 course work

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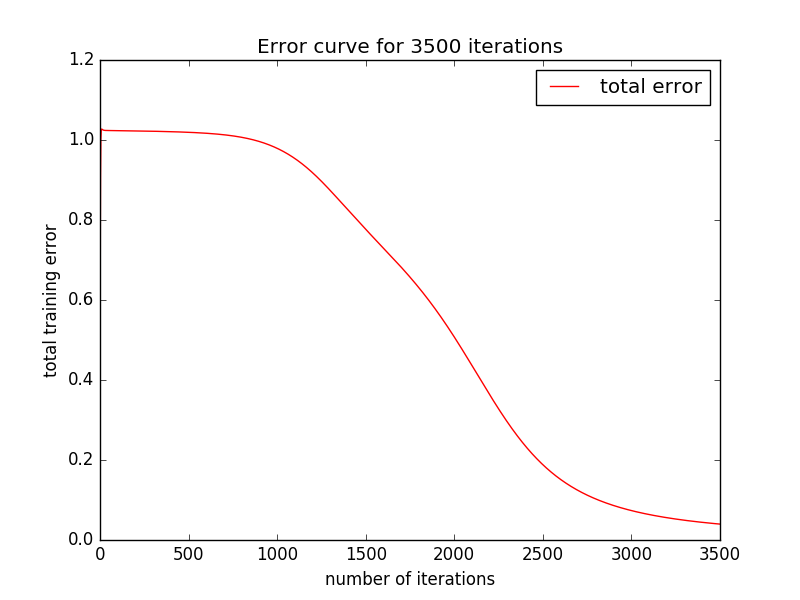
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Part 1 Backpropagation

*1) Set up your network in a 2-input, 4-hidden and 1-output configuration. Apply the XOR training set. Initialize weights to random values in the range -0.5 to +0.5 and set the learning rate to 0.2 with momentum at 0.0.*

*a) Define your XOR problem using a binary representation. Draw a graph of total error against number of epochs. On average, how many epochs does it take to reach a total error of less than 0.05? You should perform many trials to get your results, although you don’t need to plot them all.*

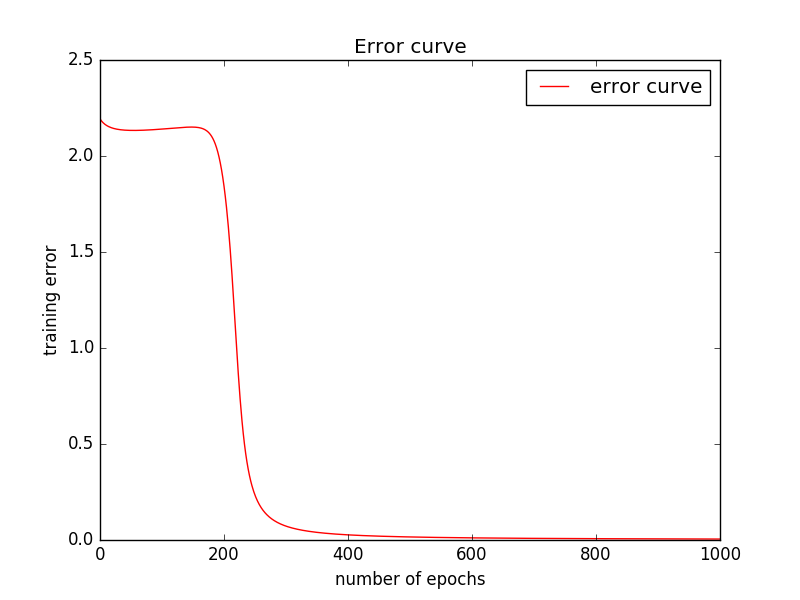
Graph:



I ran a total of 100 training sessions and find out the average number of iterations needed to reach an error of 0.05 is 4331.

*b) This time use a bipolar representation. Again, graph your results to show the total error varying against number of epochs. On average, how many epochs to reach a total error of less than 0.05?*

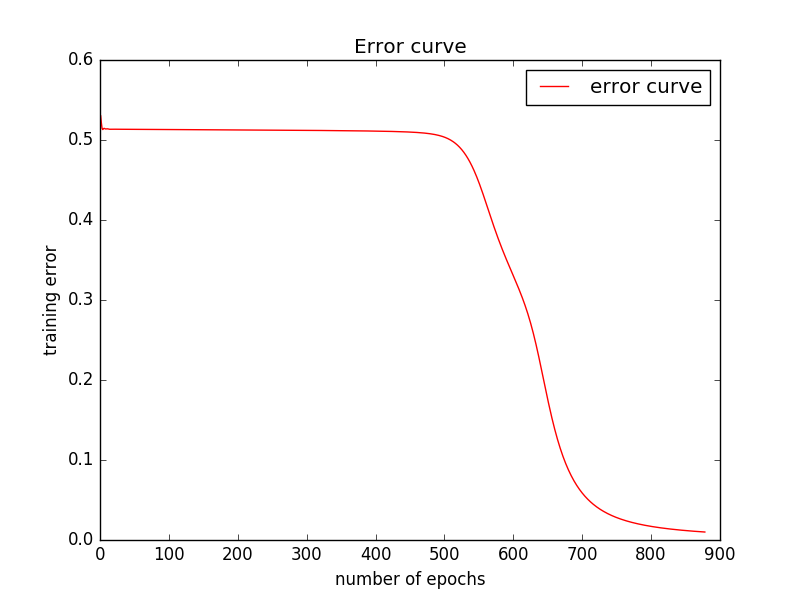
Graph shown below : for 1000 iterations



I ran a total of 100 training sessions ,and find the average number of iterations needed to reach an error of 0.05 is 347.

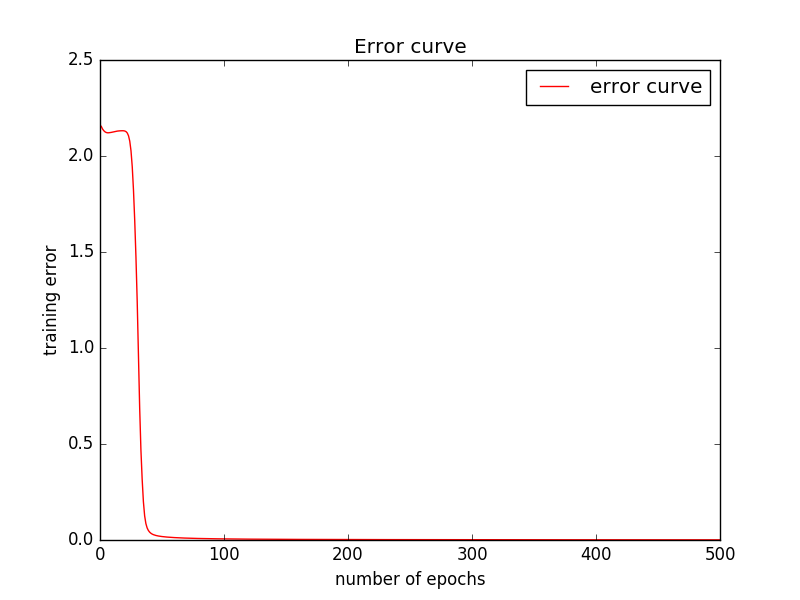
*c) Now set the momentum to 0.9. What does the graph look like now and how fast can 0.05 be reached?*

Graph for Binary representations(900 iterations) :



I ran a total of 100 training sessions and the reported Average number of iterations needed to reach 0.05 error is 333

Graph for bipolar representation(500 iterations) :



I ran a total of 100 training sessions and the reported average number of iterations needed to reach an error of 0.05 is 52.