CS 303-01: Introduction to Machine Learning

HW 3 (Given Sept. 19, 2018; Due Sept. 27, 2018)

Email your answers to the TA before midnight on the day it is due

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Numbers in the parentheses indicate points allocated to the question.

1. Implement the back-propagation algorithm in the language of your choice. You may want to write the program in a way that can read a training data file, a separate test data file, and any other parameters (number of hidden neurons for example). You may use any language of your choice though you must implement it from the ground up (e.g. Matlab is fine but use constructs like the for loop, if-then etc. to implement it. Do not use library routines). **(30 points)**

   (a) A datafile entitled "hw3trainingdata" has been shared with you. There is 1 input and 1 output. Decide on the number of hidden neurons and then train a network until a suitable stopping criteria is met (average error over trainig patterns is less than 0.01 for example)

   i. Plot (or write out the sequence) of how J decreases over time **(10 points)**

   ii. Estimate the testing error based on file "hw3testingdata" **(10 points)**

   iii. Double the number of hidden neurons that you used above. Repeat the above two problems i.e. how J decreases and the testing error **(10 points)**

   iv. Triple the number of hidden neurons that you used above. Repeat the above two problems i.e. how J decreases and the testing error **(10 points)**

   v. What can you say about the size of the network and the testing error from the above **(10 points)**