CS 760 Homework 3: Neural Network

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QUESTION 1

To run the program, type the following command:

nnet l h e <train-set-file> <test-set-file>

where l specifies the learning rate, h the number of hidden units and e the number of training epochs.

Code:

- nn_alg.py: implements binary classification network with zero or one hidden layer

- util.py: the definitions of some constants and helper functions

- nnet.py: run neural network, return test results

Dependencies:

- pyhton 2.7

- numpy

- scipy

- sys

QUESTION2

For this part, you will explore the effect of hidden units and the number of training epochs. Using heart_train.arff and heart_test.arff, you should make two graphs showing error-rates versus the number of training epochs. For the first graph, plot training and testing error rates for a single-layer network trained for 1, 10, 100 and 500 epochs, using a learning rate of 0.1. For the second graph, plot similar curves for a network with 20 hidden units. Be sure to label the axes of your plots.
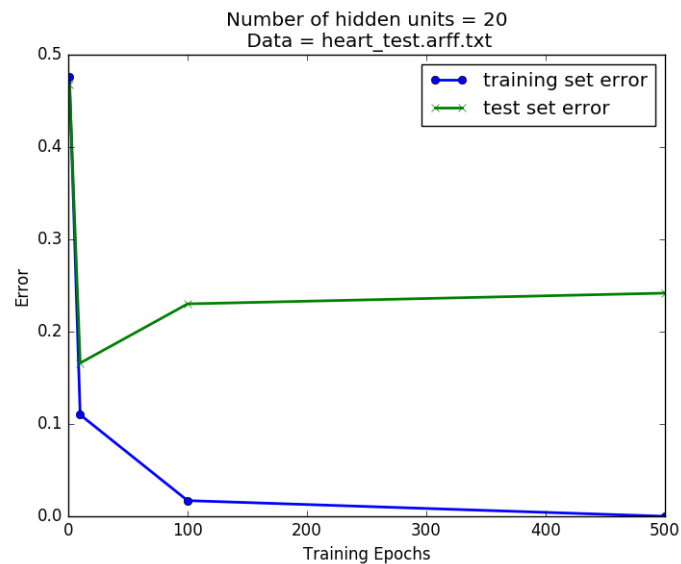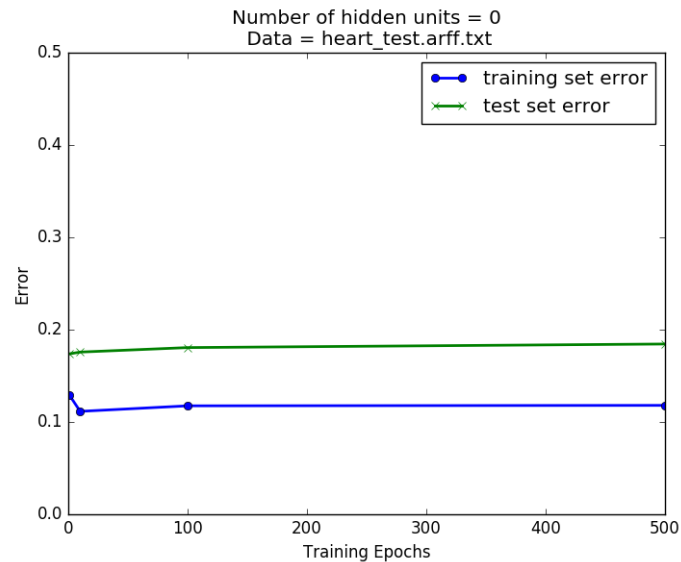
For this part, you should produce ROC curves for two data sets. Use the activation of the output unit as the measure of confidence that a given test instance is positive, and plot ROC curves for both the heart data set indicated above, and the lymphography data set lymph_train.arff, lymph_test.arff. Be sure to label the axes of your plots.