CMSC 678 Project 3

Paul Hudgins

Department of Computer Science
Virginia Commonwealth University
Richmond, VA, USA

Abstract—**This report details the author's methods and results for CMSC 678 Project 3. A two-layer neural network was evaluated using a single split of a cancer data set. Performance comparisons were made for the number of iterations and number of hidden layer neurons.**

   Keywords-Neural network, Matlab,

I.   RUNNING THE PROJECT

   Code for Part 1 can be executed by running hudgins_project3.m. A total of 28 training periods will be executed, so execution may take several minutes.

II.   METHODS

A.   Neural Network Design

   A two-layer neural network was developed in Matlab based on the methods described in [1]. Hyperbolic tangent was used as the activation function for hidden layer neurons. After experimentation, a learning rate of 0.02 was used.
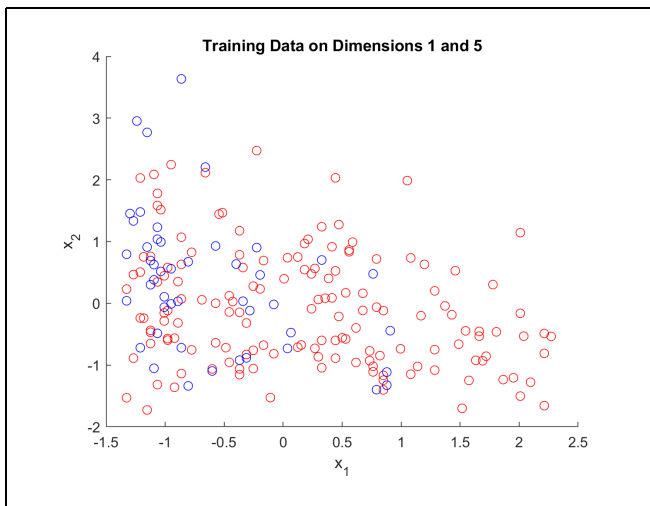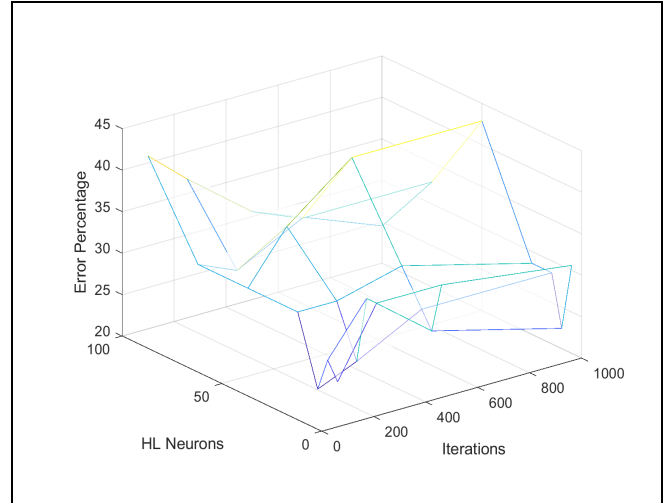

Figure 2.   Errors for training and epochs.

B.   Dataset and Experimental Setup

   Training data consisted 198 examples of two-dimensional cancer-related data, divided into two classes. Training data is not linearly separable. A two-dimensional projection of this data is shown in Figure 2. Neural networks were evaluated on a 75-25 split of this data. Evaluation was performed for four different numbers of iterations: 100, 250, 500, and 1000. For each of these, evaluations were performed for the following numbers of hidden neurons: 5, 10, 15, 25, 50, 75, 100.

III.   RESULTS

Comparison of performance for numbers of hidden neurons and iterations is provided in Figure 2. The lowest error percentage achieved was E = 22.45% for N = 15 and I = 100. The lowest error achieved for class 1 was 2.86% and the lowest error achieved for class 2 was 35.71%.

Figure 1.   Training data on two dimensions.

REFERENCES

[1]   V. Kecman, 'Multilayer Perceptron ie Neural Network', Virginia Commonwealth University, 2018