CSCE420: Introduction to Artificial Intelligence

Programming Assignment 6 : Learning

Dylan Shell

April 17, 2014

1   Problem

In this programming assignment, you are asked to train a feed-forward neural network from data in order to build a model. Both training and evaluation data are provided, you are asked to submit a report describing your neural network and its performance on the two data sources.

2   Project Infrastructure

Download and install GNU/Octave; it has a neural network package that allows you to instantiate a feed-forward neural network, train it, and simulate its behavior easily.

An input file with training and evaluation data are available at:

```
http://robotics.cs.tamu.edu/dshell/cs420/training_data.txt
http://robotics.cs.tamu.edu/dshell/cs420/evaluation_data.txt
```

3   Assignment

Construct a feed-forward network consisting of three artificial neurons: two nodes connected to the input which feed to a single node whose output is the output of the network. This is show schematically below:
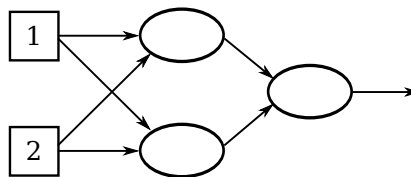
Column 1 and 2 of the data are independent variables and to be treated as input, the third column is the dependant variable, which your network should produce as output. Perform the following steps:

1. Use the training data to train your neural network.

2. Evaluate the quality of the network's predictions, in terms of MSE, on:

   (a) The training data set
   (b) The evaluation data set

Repeat this process 10 times, to evaluate variance between initialization and training randomness.

4 Submission

Due date: 25 April at 11:59pm.
Submission method: Via e-mail to the professor.

Submit in the following (electronic) form:

- Turn in a zip file which includes all the source files and a documentation like pdf file, with the items below. (Do not describe your results in the e-mail)

- The zip file should be named `student-last-name_hw-number.zip` *e.g.,* `Jim_hw6.zip`

- Subject of e-mail should be named as `[csce420]last-name_hw-number` *e.g.,* `[csce420]Jim_hw6`

 The zip should include the following:

1. A report (summary table and/or plots) showing the performance on the learning task.

2. The code you wrote for this assignment.

3. A list of the resources used (*e.g.*, online forums, links to example code on the web, *etc.*).

4. A statement of the Aggie Code of Honor.

You are encouraged to discuss this with your friends and classmates, but are expected to write your own code.

5 Some useful notes

GNU/Octave does not include the neural network package by default, instead it is distributed as part of the octave-forge package. In Ubuntu octave-forge is split into separate packages by the package manager. You can install the neural network package via:

```
$ sudo apt-get install octave-nnet
```