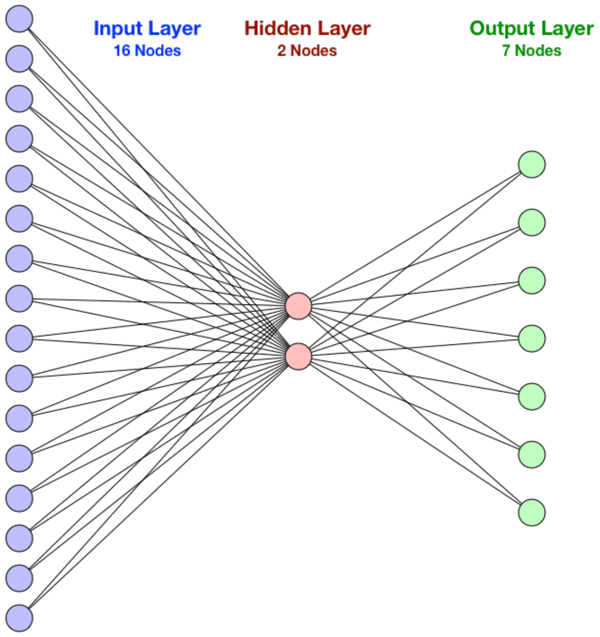
GALWAY-MAYO INSTITUTE OF TECHNOLOGY

Department of Computer Science & Applied Physics

Classifying a Zoo Animal with a Neural Network

Overview

In this practical, we will use the **normalized** Zoo data set from The Center for Machine Learning and Intelligent Systems at the University of California to classify an animal based on a set of 16 input characteristics. The Center for Machine Learning and Intelligent Systems maintains a machine learning data set repository at http://archive.ics.uci.edu/ml/index.html. The recommended neural network architecture consists of 16 input nodes, two hidden nodes and 7 output nodes.



Exercises

- Create a new class called ***ZooRunner*** and add a ***main()*** method. Inside ***main()***, add the declarations for the 2D arrays ***data*** and ***expected*** from the file **zoo.txt** in the Zip archive **aiNeuralNetData.zip**.

- Create an instance of the class ***NeuralNetwork*** with 16 input nodes, 2 hidden nodes, 7 output nodes and a sigmoidal activation function:

```
NeuralNetwork nn = new NeuralNetwork(Activator.ActivationFunction.Sigmoid, 16, 2, 7);
```

- Instantiate the back-propagation training algorithm and ask it to train the network with the training data, a learning rate of 0.6 and a maximum of 2000 epochs.

```
BackpropagationTrainer trainer = new BackpropagationTrainer(nn);
trainer.train(data, expected, 0.6, 2000);
```

- Create the following data set required to test if the network is fully trained:

```
double[] test = { 0, 1, 1, 0, 1, 0, 0, 0, 1, 1, 0, 0, 0.25, 1, 0, 0 };
double[] result = nn.process(test);

for (int i = 0; i < result.length; i++){
        System.out.println(result[i]);
}

System.out.println(Utils.getMaxIndex(result) + 1);
```

- Change the input vector slightly and examine the impact that this has on the classification decision. Experiment with the network architecture by altering the number of nodes in the hidden layer and examining the output.