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## COS 314 - Assignment 3 - Report

### Backpropagation Neural Network for Pattern Classification

The Neural Network consists of 1 input layer, **1 hidden layer**, and 1 output layer.

- The input layer has 4 neurons that correspond to the 4 input values from the data set.
- **The hidden layer consists of 6 neurons**
- The output layer has 3 neurons that correspond to the 3 types of Iris flowers.

\*Note the terms neuron and node are used interchangeably in this report.

The **Activation function** that was used is the **Sigmoid function**:

$$f(x) = \frac{1}{1 + e^{-x}}$$

The Neural Network takes in a threshold value  $\alpha \in [0,1)$ , this value indicates the minimum acceptable training accuracy. The Neural Network cycles through epochs until the training accuracy is larger than or equal to  $\alpha$ .

With  $\alpha = 0.96$ , the average the **number of epochs** that it takes to converge is 3200.

With  $\alpha = 0.99$ , the average the **number of epochs** that it takes to converge is 5100.

#### **Parameters that work well during development:**

Minimum Weight value for a Neuron = -1.0

Maximum Weight value for a Neuron = 1.0

Learning Rate = 0.05

Accuracy Threshold = 0.96