Mälardalen University

DVA 493

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Laboratory 1 report

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1 Structure

The structure of our Artificial Neural Network is a network of three layers. The first layer is the input layer, second is a hidden layer and lastly the last layer is the output layer. The input layer consists of 18 nodes that represents the attributes respectively, 2 nodes in the hidden layer and the two classes, 2 nodes, in the output layer.

2 Learning Method

The learning method of our choice was the back propagation algorithm. We begin with calculating the error term of the output layer using the formula:

$$E_o = (t - o) \cdot (1 - o) \tag{1}$$

where t is the target class and o is the predicted outcome.

The error term of the hidden layer is similar calculated using the formula:

$$E_h = (1 - o_h) \cdot o_h \cdot \sum w_o \cdot E_o \tag{2}$$

where o_h is the output of the net node, w_o is the weight from the net node to a node in the output layer, and E_o is the error term of the output layer.

For finally updating the weights w_o and w_h, we use the following formulas:

$$w_o = w_o + \eta \cdot E_o \cdot o_h \tag{3}$$

$$w_h = w_h + \eta \cdot E_h \cdot x \tag{4}$$

where w_h is a weight from a node in the input layer to a node in the hidden layer, x is an input node value, or attribute value in our case, and η is the learning rate.

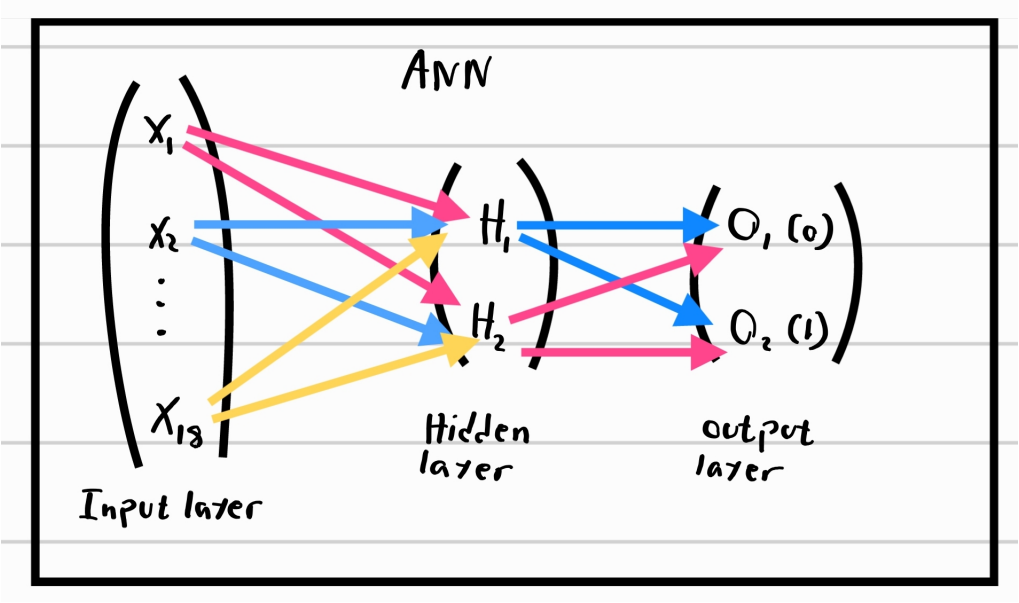

Figure 1: Figure describing the structure of our Artificial Neural Network

3 Validation

The percentage of correctness of on the test data set is 77.3%.

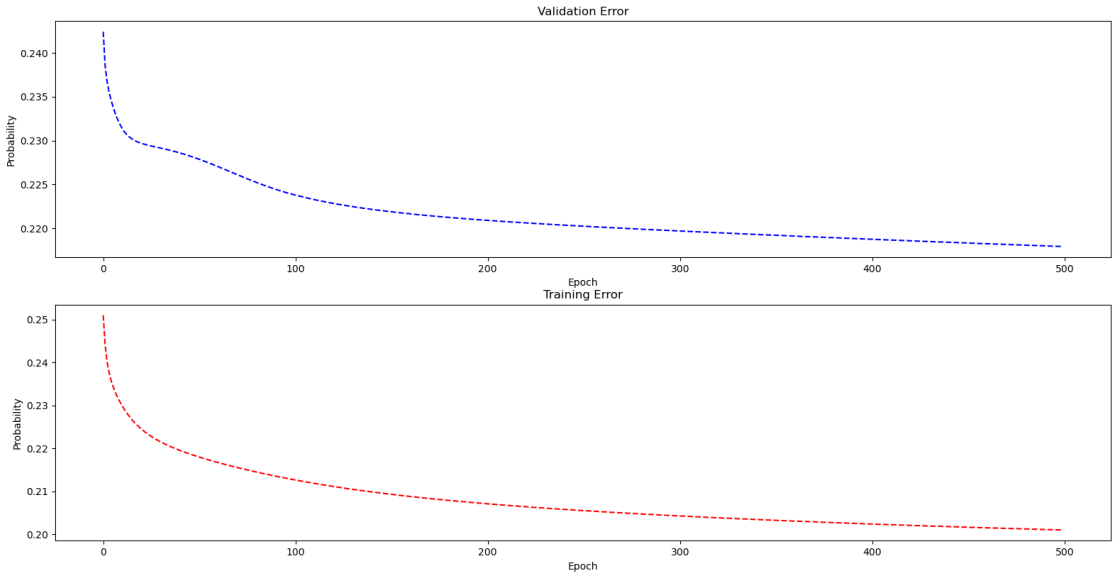

Figure 2: Figure describing the Validation Accuracy of our Artificial Neural Network