Neural Networks: Error Back Propagation

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Data Mining and Machine Learning

# Structure

# 

**Fig. 1.** MLP structure for 4-2-4 encoder

|  |  |
| --- | --- |
| **Input Pattern** | **Output Pattern** |
| 1,0,0,0 | 1,0,0,0 |
| 0,1,0,0 | 0,1,0,0 |
| 0,0,1,0 | 0,0,1,0 |
| 0,0,0,1 | 0,0,0,1 |

***Table 1****: Input-output pairs for 4-2-4 encoder*

A multi-layer perceptron (MLP) has the structure of a 4-2-4 encoder as shown in Fig. 1. It has four input units, two hidden layer units and four output units, with a sigmoid activation function for each unit. The encoder should map the inputs into their corresponding outputs and going into the input units are four different patterns, equal to the target outputs, as shown in Table 1. The training set of the error back propagation algorithm (EBP) consists of the previously mentioned four input-output pairs. But because of the sigmoid activation function in each unit, the values of 0 and 1 will never be realized so for practical purposes the values of 1 and 0 will be replaced by 0.9 and 0.1, respectively.

The training algorithm and the structure of the encoder was coded using MATLAB, iterated for 1000 times, cycling through the four input patterns while accumulating the weights so that the weights are updated only after all four input patterns have gone through a single iteration.

# Results

The results

# Appendix

1. MATLAB Code: EBP without bias



1. MATLAB Code: EBP with bias

