Training of a two-layer Perceptron network for the exor function problem

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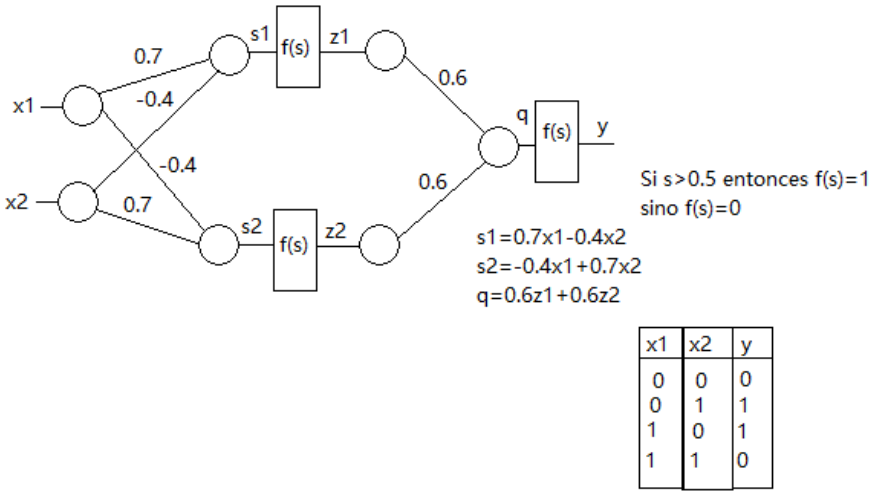
Introduction

A perceptron network is a neural network in which there are N inputs whose interaction translates into outputs that will lead to a conclusion.
A single-layer perceptron can simulate the behavior of logical functions such as and or or not.
But to achieve a behavior similar to that of an exor function, at least two layers in which the interaction is linear or one layer in which there are nonlinear operators are needed.
The following figure shows what an exor function with two layers would look like in which the output activation function of each layer is equivalent to 1 If function greater than threshold.



x1	x2	y
0	0	0
0	1	1
1	0	1
1	1	0

Figure 1

to achieve a learning or training process of a neural network, it is preferable to use a continuous function such as the sigmoidal one and apply a learning process similar to that of a function and in an adaline. In this case, the backpropagation learning procedure will be used.

Learning procedure

To train a single-layer Adalin network, an algorithm is used in which each new value of the network weights is recalculated based on the measure of the error between the expected output and the obtained output where What is the obtained output and te is the expected output.

w(j+1)=w(j)+a(t(t(l) -y)x(j)

The network is then fed with the new weights in the hope that the new values of and will approximate the expected values.

$$S_i = \sum w(i,j)x(j)$$