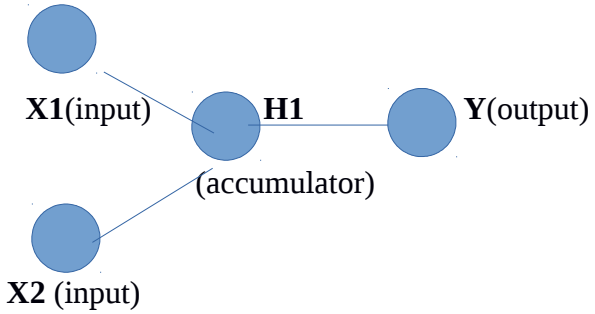
Saurav Keshari Aryal
CMSC 727: Neural Modeling
Dr. James Reggia
14 February 2017

Assignment – 1

1. **Feedforward Network of Linear Threshold Units**

Network Sketch:



Weights Theta1 and Theta2 were intiliazed randomly.

Design:

The script file xor.m calls a xor_mm.m function file to learn the xor function using MLP. A simple sigmoid function as used as the cost function. The network consists of an accumulator hidden layer with one node, input are two nodes, and one output.

Output:

The final output was as follows:

Hypothesis for
0 0 is 0.030126
Hypothesis for
0 1 is 0.98008
Hypothesis for
1 0 is 0.97345
Hypothesis for
1 1 is 0.026046

***2.* Elementary Perceptron Learning**

c)

1) → The xor one is not linearly separable, the odd parity one is, and the pattern classification is the one I am not sure about. The Xor problem is a classic non-lineraly separable problem, the odd parities can be linearly separated from the even parities can be computed completely by an elementary perceptron. On the other hand, the pattern classification is not deterministic and may not be linearly seperable for cases we are not provided. The results are not surprsing.

2) →

3) → The input patterns can be made linearly seperable by a modulo function. Hence, they can be classified as linearly separable. However, as they are, they are not linearly separable.

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Semester Project Request

As part of my semester project for the semester, I would like to work on a signigicant portion of one of my current research projects. The project involves making a fail operational car system by analyzing in-vehicular network packets. For this purpose, I am specifically working on intrusion detection and would like to use some flavor of neural network (probably in combination with some well-known and determinsitic approaches) for classifying intrusive network packets versus normal packets.

I would request to be allowed to work on the project by myself. Since I attend Howard University and lack a driver's license, it would be greatly difficult for me work in a group. As this would allow me work more with my research while satisfying the objective of the course project, I consider allowing me to work on this. I shall present a proposal about the project by next class.