CS561 - ARTIFICIAL INTELLIGENCE LAB

ASSIGNMENT-6: Neural Networks

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Students:

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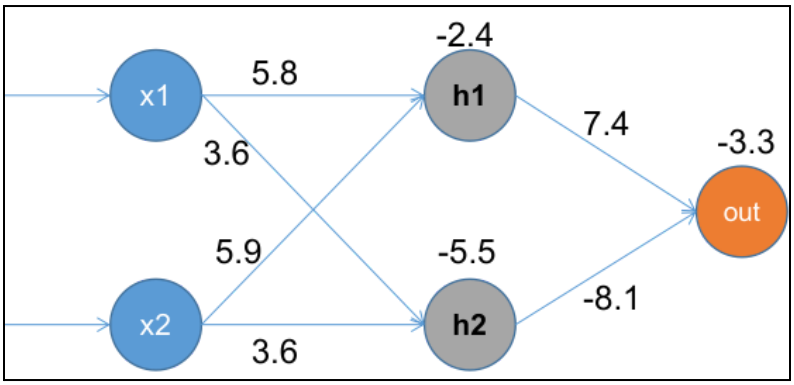
Q1. For simulating an XOR gate, we used a multi-layer perceptron model with:

An **input layer** consisting of two neurons,
One **hidden layer** consisting of two neurons,
An **output layer** consisting of one neuron.

The following diagram depicts the neural network:



The weight matrix for input layer and hidden layer is:

	h1	h2
x1	5.8	3.6
x2	5.9	3.6

The bias at h1 is -2.4 and h2 is -5.5

The weight matrix for hidden layer and output layer is:

	out
h1	7.4
h2	-8.1

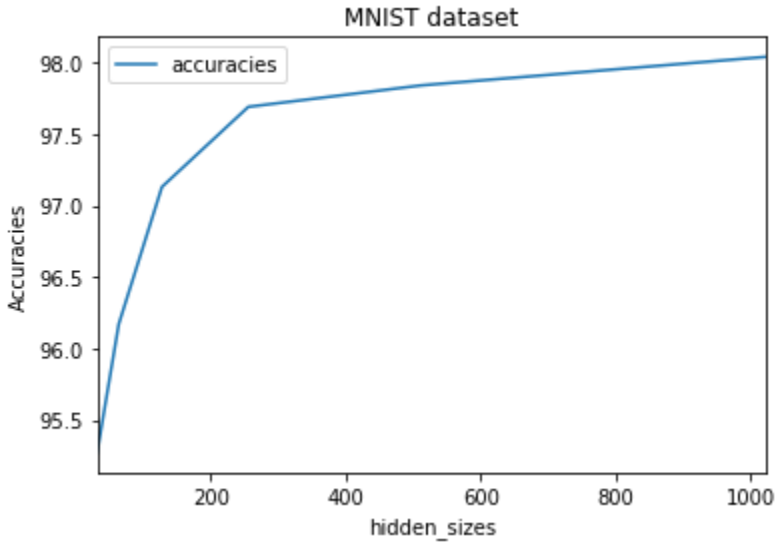
The bias at out is -3.3. **Threshold is 0.5**

Final Output:

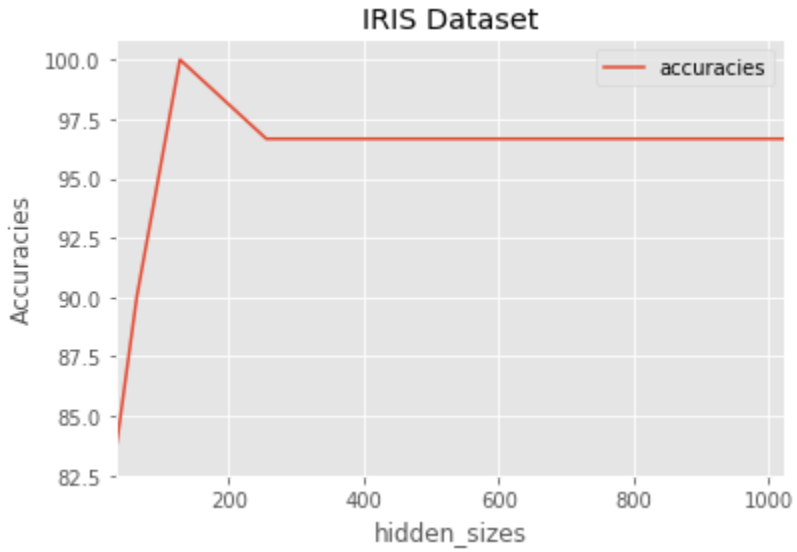
```
Truth Table of XOR gate neural network:
[[0 0 0]
 [0 1 1]
 [1 0 1]
 [1 1 0]]
```

Q2. We use a single hidden layer based neural network for MNIST and IRIS dataset classifications.

We vary the number of neurons in the hidden layer and plot the variation in the obtained classification accuracy. We include the number of hidden layer neurons from the list [32,64,128,256,512,1024].



The graph above is for the MNIST dataset. We can see that the accuracy increases with increase in the number of neurons upto 1024.



The graph above shows accuracy vs number of hidden layer neurons for the IRIS dataset. We can see that the accuracy increases from 32 neurons and reaches a peak around 128 neurons. After 128 neurons, the accuracy steadily decreases up until 256 neurons and thereafter remains constant. This behaviour can be because the input length is just four and the number of training instances is 120.