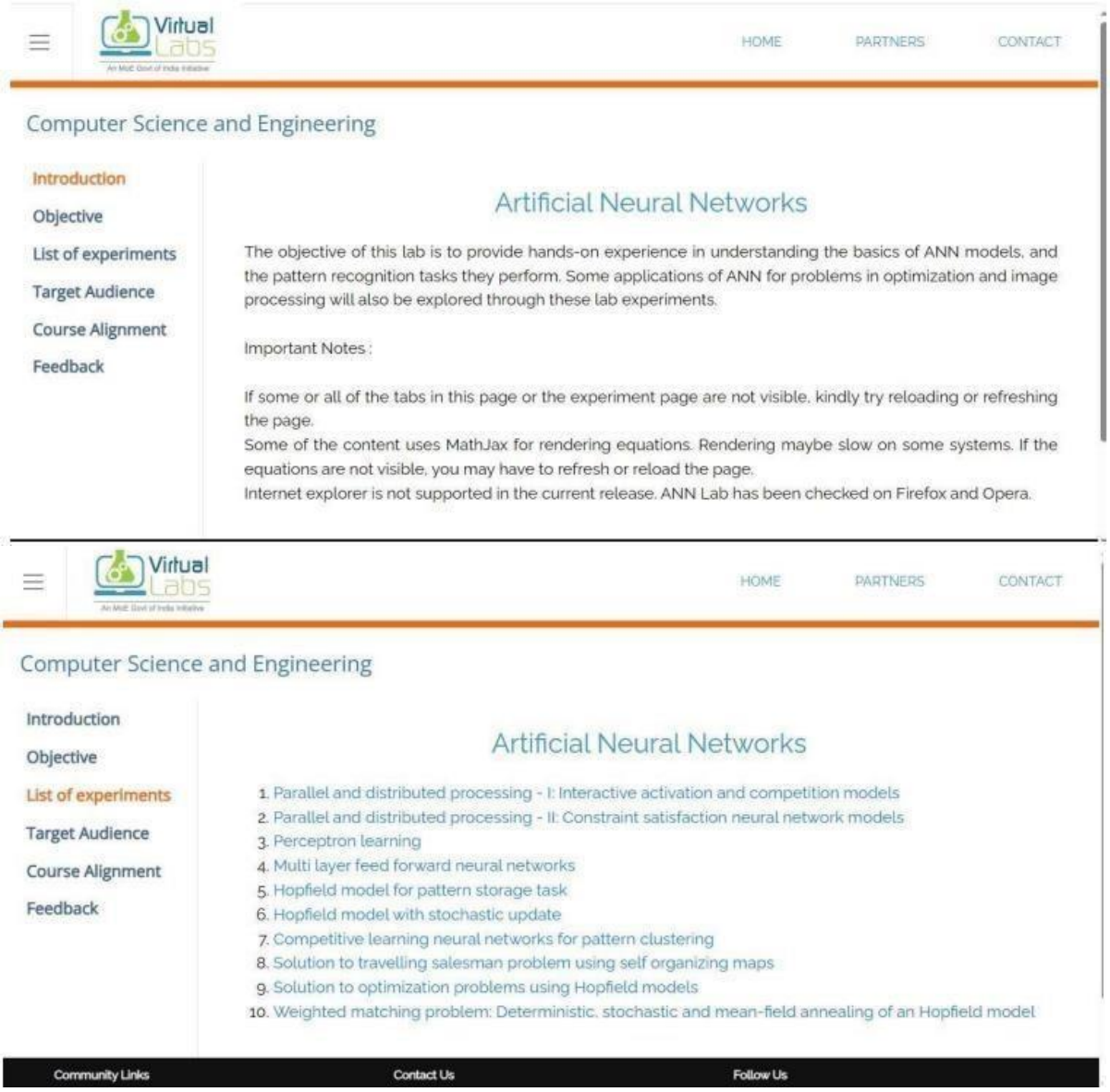
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Artificial Neural Networks
The objective of this lab is to provide hands-on experience in understanding the basics of ANN models, and the pattern recognition tasks they perform. Some applications of ANN for problems in optimization and image processing will also be explored through these lab experiments.
Important Notes :
If some or all of the tabs in this page or the experiment page are not visible, kindly try reloading or refreshing the page.
Some of the content uses MathJax for rendering equations. Rendering maybe slow on some systems. If the equations are not visible, you may have to refresh or reload the page.
Internet explorer is not supported in the current release. ANN Lab has been checked on Firefox and Opera.
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3. Perceptron learning
4. Multi layer feed forward neural networks
5. Hopfield model for pattern storage task
6. Hopfield model with stochastic update
7. Competitive learning neural networks for pattern clustering
8. Solution to travelling salesman problem using self organizing maps
9. Solution to optimization problems using Hopfield models
10. Weighted matching problem: Deterministic, stochastic and mean-field annealing of an Hopfield model
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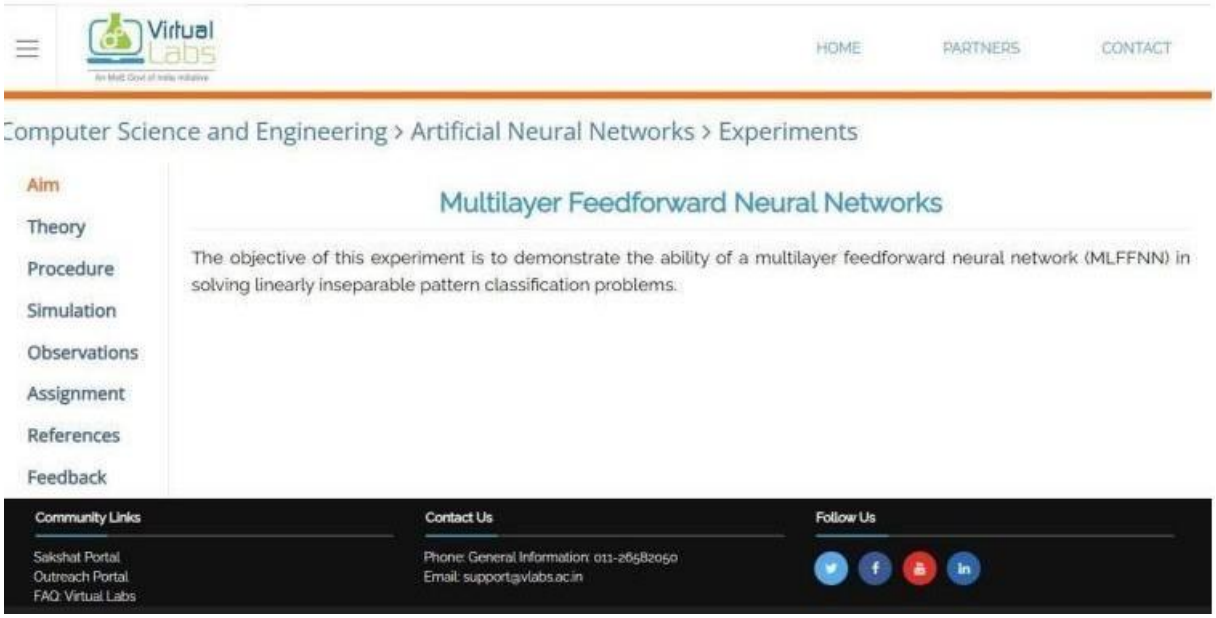
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Multilayer Feedforward Neural Networks
The objective of this experiment is to demonstrate the ability of a multilayer feedforward neural network (MLFFNN) in solving linearly inseparable pattern classification problems.
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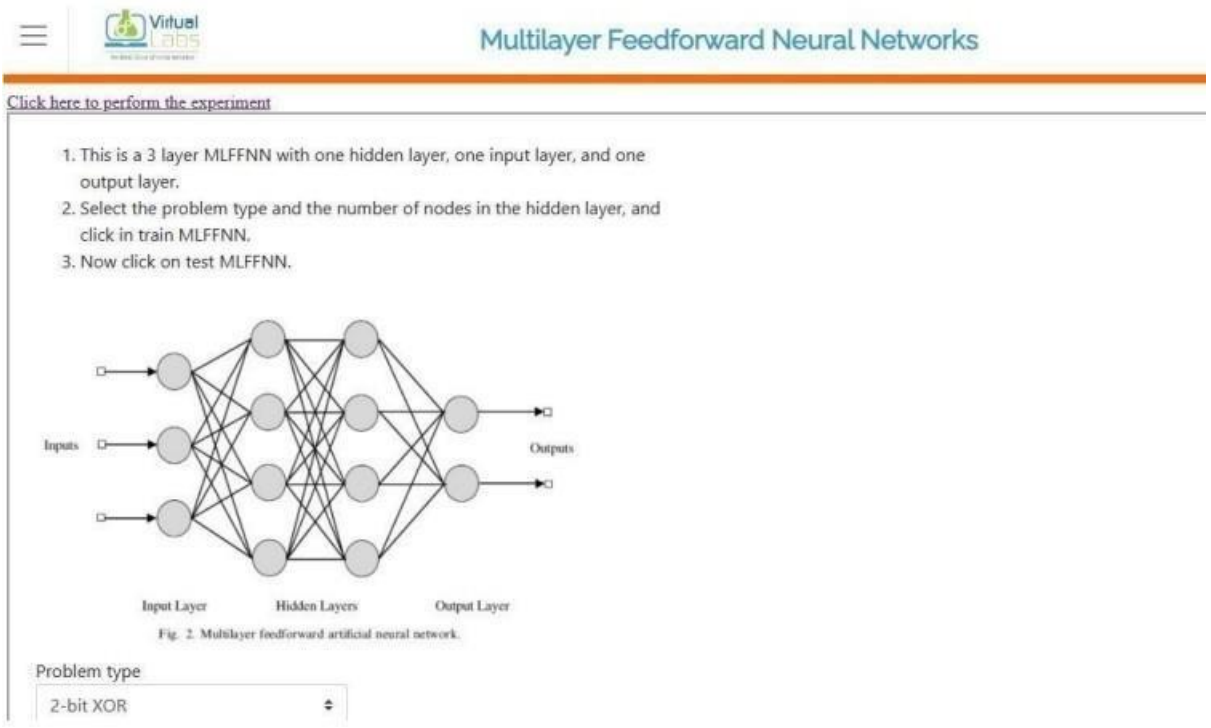
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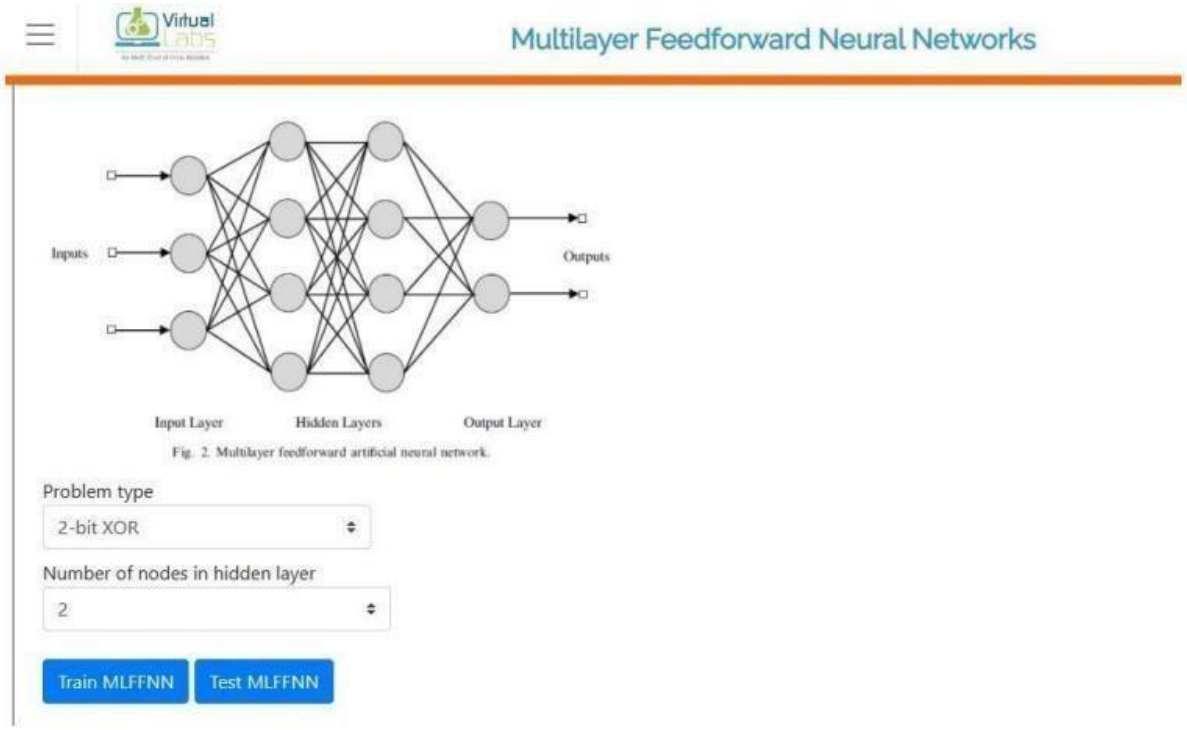
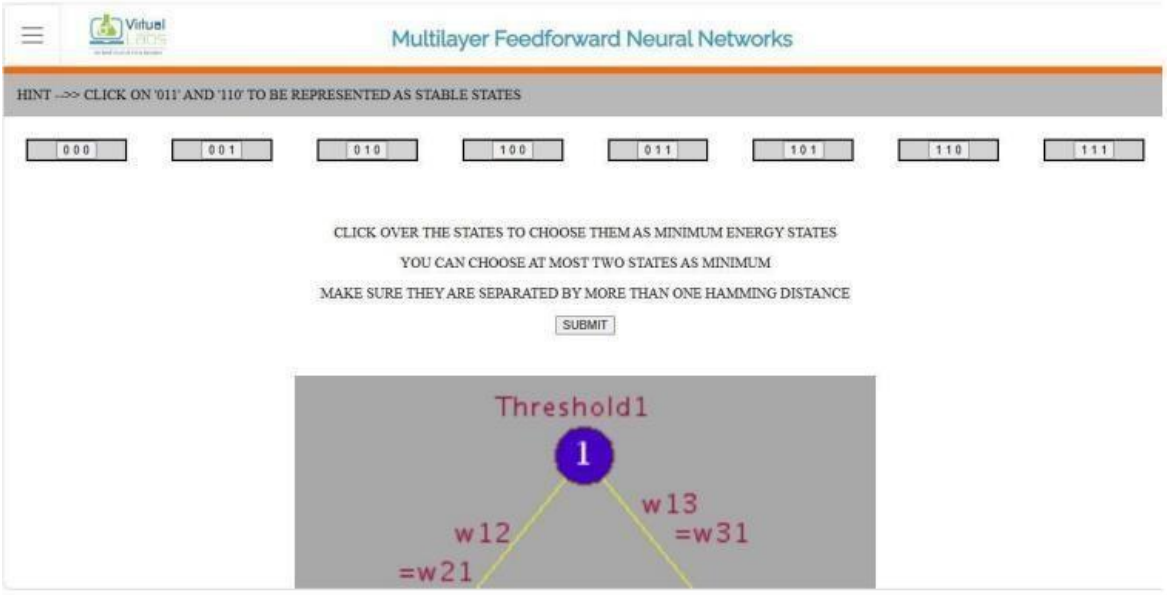
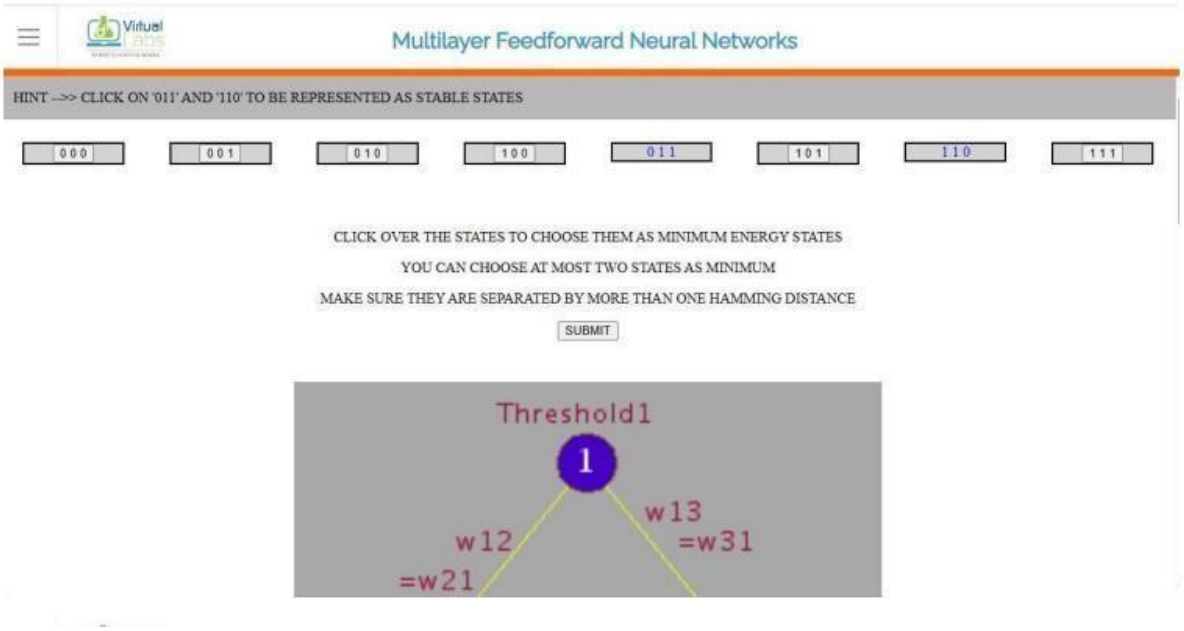
Multilayer Feedforward Neural Networks
Click here to perform the experiment
1. This is a 3 layer MLFFNN with one hidden layer, one input layer, and one output layer.
2. Select the problem type and the number of nodes in the hidden layer, and click in train MLFFNN.
3. Now click on test MLFFNN.
Inputs
Outputs
Input Layer
Hidden Layers
Output Layer
Fig. 2. Multilayer feedforward artificial neural network.
Problem type
2-bit XOR


Multilayer Feedforward Neural Networks
Inputs
Outputs
Input Layer
Hidden Layers
Output Layer
Fig. 2. Multilayer feedforward artificial neural network.
Problem type
2-bit XOR
Number of nodes in hidden layer
2
Train MLFFNN
Test MLFFNN


Multilayer Feedforward Neural Networks
HINT -->> CLICK ON '011' AND '110' TO BE REPRESENTED AS STABLE STATES
000
001
010
100
011
101
110
111
CLICK OVER THE STATES TO CHOOSE THEM AS MINIMUM ENERGY STATES
YOU CAN CHOOSE AT MOST TWO STATES AS MINIMUM
MAKE SURE THEY ARE SEPARATED BY MORE THAN ONE HAMMING DISTANCE
SUBMIT
Threshold1
1
w13
=w31
w12
=w21


Multilayer Feedforward Neural Networks
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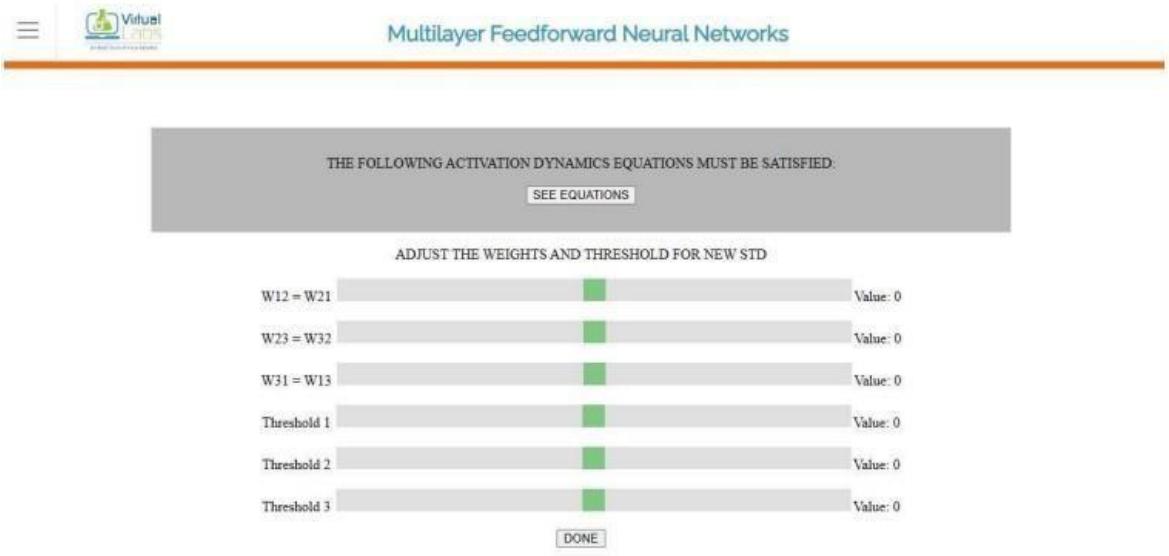
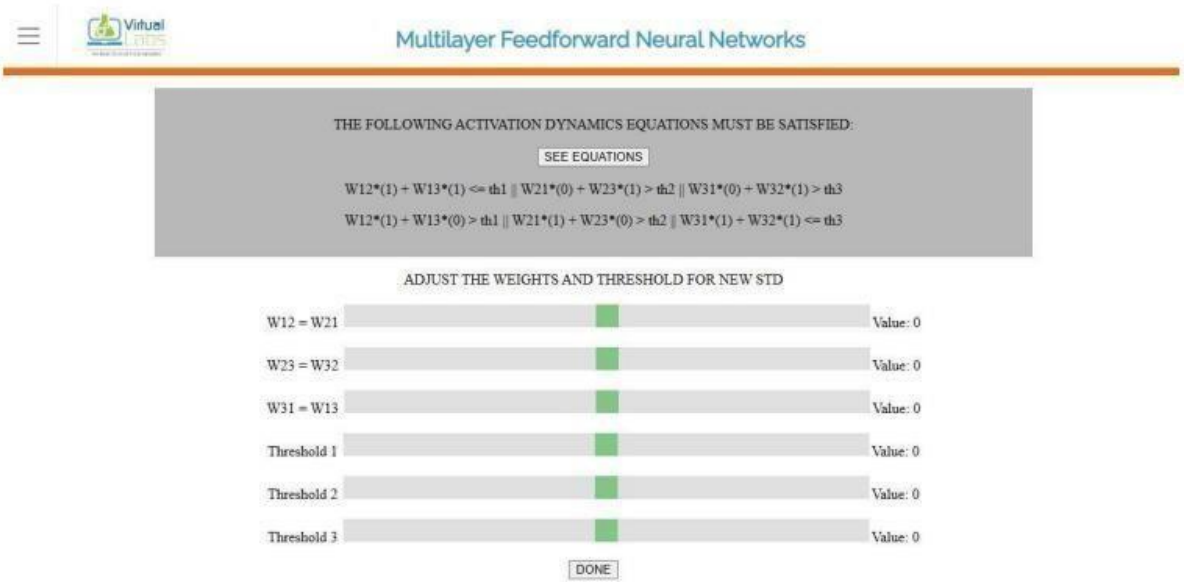
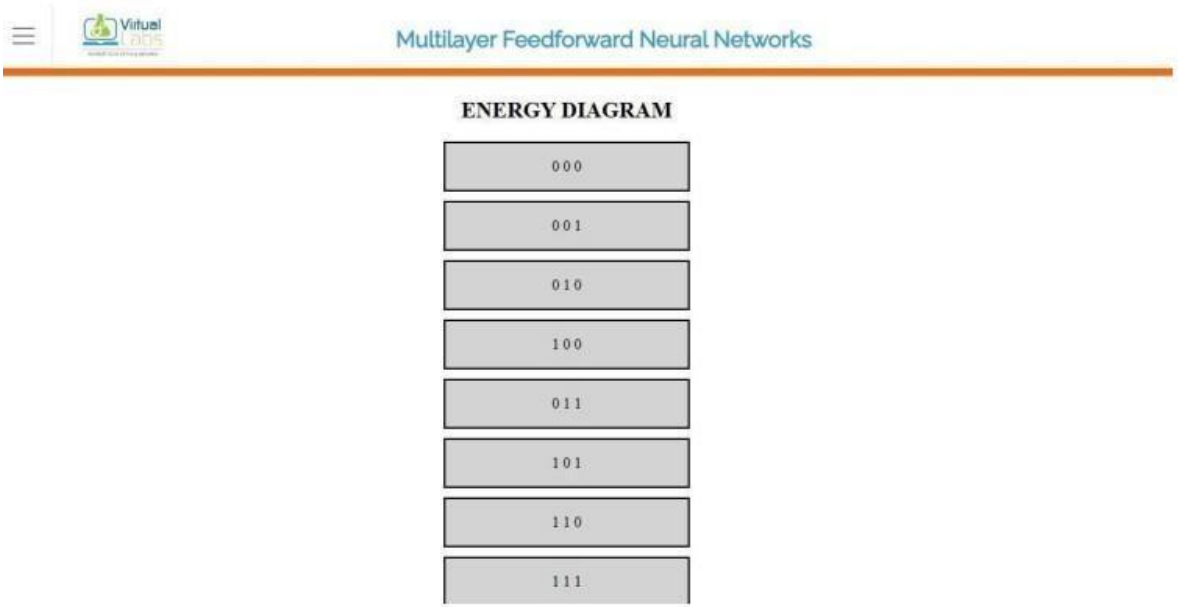
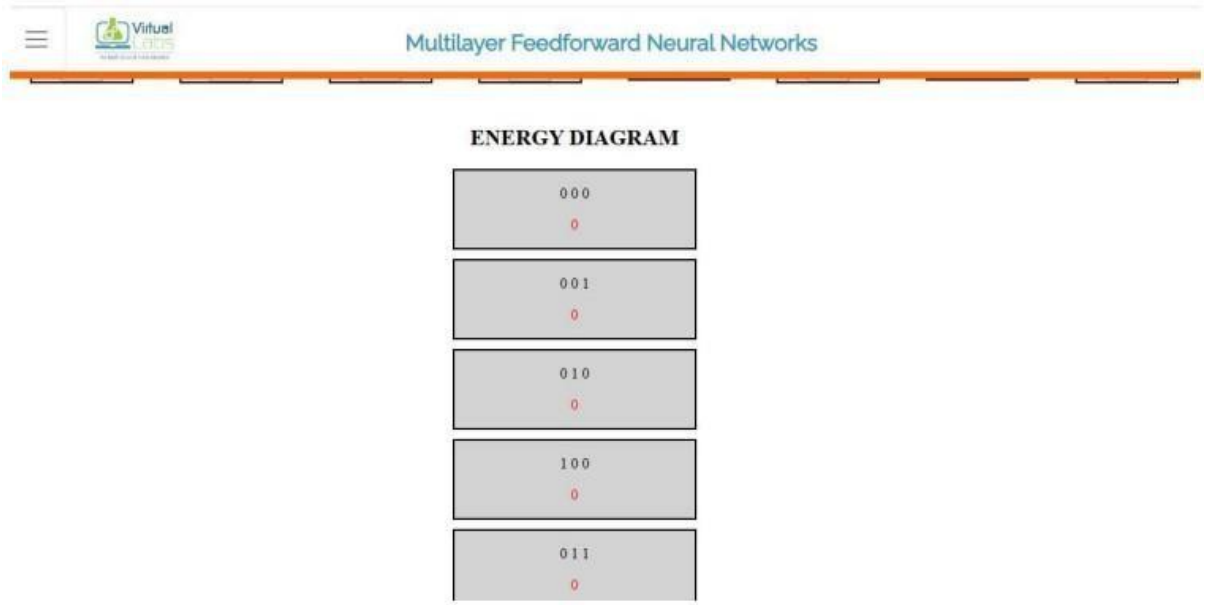
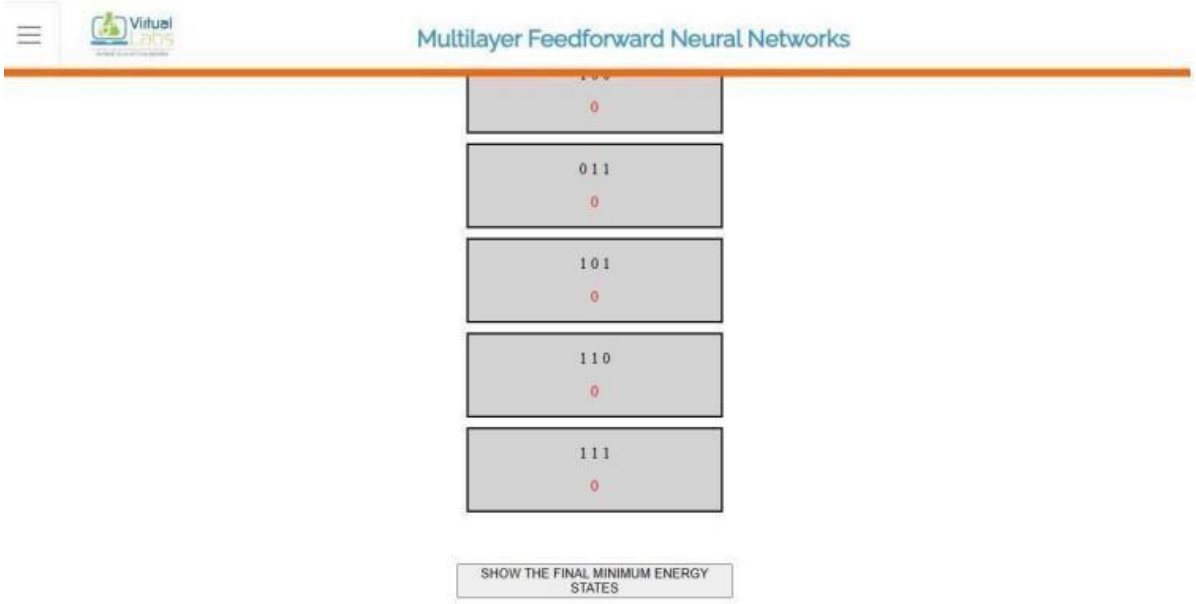

Multilayer Feedforward Neural Networks
THE FOLLOWING ACTIVATION DYNAMICS EQUATIONS MUST BE SATISFIED:
SEE EQUATIONS
ADJUST THE WEIGHTS AND THRESHOLD FOR NEW STD
W12 = W21
Value: 0
W23 = W32
Value: 0
W31 = W13
Value: 0
Threshold 1
Value: 0
Threshold 2
Value: 0
Threshold 3
Value: 0
DONE


Multilayer Feedforward Neural Networks
THE FOLLOWING ACTIVATION DYNAMICS EQUATIONS MUST BE SATISFIED:
SEE EQUATIONS
W12*(1) + W13*(1) <= th1 || W21*(0) + W23*(1) > th2 || W31*(0) + W32*(1) > th3
W12*(1) + W13*(0) > th1 || W21*(1) + W23*(0) > th2 || W31*(1) + W32*(1) <= th3
ADJUST THE WEIGHTS AND THRESHOLD FOR NEW STD
W12 = W21
Value: 0
W23 = W32
Value: 0
W31 = W13
Value: 0
Threshold 1
Value: 0
Threshold 2
Value: 0
Threshold 3
Value: 0
DONE


Multilayer Feedforward Neural Networks
ENERGY DIAGRAM
0 0 0
0 0 1
0 1 0
1 0 0
0 1 1
1 0 1
1 1 0
1 1 1


Multilayer Feedforward Neural Networks
ENERGY DIAGRAM
000
0
001
0
010
0
100
0
011
0


Multilayer Feedforward Neural Networks
0
011
0
101
0
110
0
111
0
SHOW THE FINAL MINIMUM ENERGY STATES