**Artificial Neural Network**

**Lab: 01 to 10**

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**Assignment Results**

**Assignment: 1**

1. The code converges in 2 iterations. The converged weight vector is w=[-0.0995 -0.4443 0.7749 -0.4385] when eta is 1.0.
2. The code converges in 1000 iterations. The converged weight vector is w=[-0.0195 -0.5063 0.8323 -0.2248] when eta is 1.0.
3. The code converges in 3 iterations. The converged weight vector is [0.0000 0.7000 0.4000 0.5000] when eta is 0.1.
4. Using perceptron training rule, the code converges in three iterations.The weights obtained are [-0.0141 -0.6190 -0.7853] with eta as 1.0.

With Hebbian rule, the code is not converging

**Assignment: 2**

1. Using perceptron training rule, the code converges in 2 iterations. The weights obtained are [0.8000 0.1000 -0.6000] with eta as 1.0
2. With eta has 0.5 and lamda 0.5, it converges in 13 iterations. The weight vector obtained is [8.0763 -0.6312 -8.1302].

As the value of eta increases, the number of iterations required also increases.With eta as 1, it never converges.

1. The windrow-Hoff learning rule converges with eta as 0.01 in 23 iterations. The weight vector is [1.0034 0.9944]

**Assignment: 3**

In the table weight vector includes biased term:

|  |  |  |  |
| --- | --- | --- | --- |
| **Perceptron Algorithm** | | | |
| Initial weights – [0 0 0] | | | |
| 1. | AND | eta-0.1 | [- 0.6 0.3 0.4] |
| 2. | OR | eta-0.01 | [0.1000 0.1000 0.1000] |
| 3. | AND-NOT | eta-0.1 | [0.3000 -0.1000 -0.1000] |
| 4. | XOR | eta-0.01 | [-1.3998 0.9097 0.9150] |
| 5. | AND | eta-0.01 | [-0.4868 0.4841 0.4813] |
| **Widrow-Hoff Learning Rule** | | | |
| 6. | OR | eta-0.05 | [0.3223 -0.1666 -0.1825] |
| 7. | AND-NOT | eta-0.005 | [0.1000 -0.3000 -0.3000] |
| 8. | XOR | eta-0.005 | [0.2300 -0.3000 -0.211] |

**Assignment: 4**

1. The input is x1=[1,1,0,0]’; and x2=[1,0,1,0] and threshold = 2.

|  |  |
| --- | --- |
| **AND(Binary i/p)** | Y=[ 1 0 0 0] |
| **OR(Binary i/p)** | Y=[ 1 1 1 0] |
| **AND NOT (Binary i/p)** | Y=[ 0 1 0 0] |

And other Questions of this lab is done in matlab file.

**Assignment: 5**

1. When six images are stored, they can be recalled correctly.
2. If any image is stored also, upto 6 images can be recalled correctly

**Assignment: 6**

The data is fed to the network as a matrix.Hopfield network has been implemented and when the distorted image is shown to the network, it got classified as a Tank.

**Assignment: 7**

In this lab, I made only A and B. For the rest, there is an error.

**Assignment: 8**

1. When the distorted image is presented, the pattern one corresponding to plane. When the first data X\* is presented, the pattern (1,0,0,1) is returned but X\*\* is a limit cycle at a hamming distance of 4,8 from patterns A1 and A2
2. X1=[ -1 1 -1 1 -1] and X2=[ -1 1 1 1 -1]
3. Hamming distance of X\*and X\*\* is ∑│Ai - Bi│= 2

**Assignment: 9**

1. When the actual pattern was applied at the input, the corresponding paired pattern could be retrieved. When the following noise pattern was given:

|  |  |  |
| --- | --- | --- |
| 1,-1,1,1,-1,-1,-1,-1,-1,1,1,1,1,-1,-1 | Y3 | 2 |
| 1,1,1,-1,1,1,-1,1,1,1,-1,-1,1,1,-1 | Y1 | 1 |
| -1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1 | Limit cycle | 3 |

**Assignment: 10**

1. All the data points are classified correctly by the SBAM except the 5th data point. As per the data no of defects are 2 but predicted as 4.