

# ASSIGNMENT - 10

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## # Q1. Auto Associative Neural Network

```
import numpy as np

tar = np.array([

    [1,1,1,1],

    [1,1,-1,-1]

])

class Hopfield_Net:

    def __init__(self):
        self.wei= np.dot (tar.T, tar)
        for i in range(len(self.wei)):
            self.wei[i][i]=0;
        self.thresh=0
        print(self.wei,"\n")

    #Threshold
    def check_thresh(self, y_in, y):
        output=y
        if(y_in>self.thresh):
            output=1
        elif(y_in<self.thresh):
            output=0
        # print(output,'output')
        return output

    def parse(self, matrix_inp):
        for x in matrix_inp:
            y=x
            y_in=y
            order = [1,4,3,2]
            iter=0
```

```

while True:
    temp = list(y)
    for i in order:
        sum=0
        c=0
        for row in self.wei:
            sum+=y[c]*row[i-1]
            c=c+1
        y_in[i-1]=x[i-1] + sum
        y[i-1]=self.check_thresh(y_in[i-1], y[i-1])
        print(y)
    if np.array_equal(y,temp):
        break
    iter+=1
print("\n",iter," - Iterations\n")

```

```

print("-----")
matrix_inp = np.array([[1,1,1,1],
                        [1,1,-1,-1],
                        [1,1,1,0]])
h_model=Hopfield_Net()
h_model.parse(matrix_inp)

```

OUTPUT: -

```
Assignment 10_190001003.ipynb Assignment 10_190001003.ipynb (output) X
1 | -----
2 | [[0 2 0 0]
3 |  [2 0 0 0]
4 |  [0 0 0 2]
5 |  [0 0 2 0]]
6 |
7 | [1 1 1 1]
8 | [1 1 1 1]
9 | [1 1 1 1]
10 | [1 1 1 1]
11 |
12 | 0 - Iterations
13 |
14 | [ 1  1 -1 -1]
15 | [ 1  1 -1  0]
16 | [1 1 0 0]
17 | [1 1 0 0]
18 | [1 1 0 0]
19 | [1 1 0 0]
20 | [1 1 0 0]
21 | [1 1 0 0]
22 |
23 | 1 - Iterations
24 |
25 | [1 1 1 0]
26 | [1 1 1 1]
27 | [1 1 1 1]
28 | [1 1 1 1]
29 | [1 1 1 1]
30 | [1 1 1 1]
31 | [1 1 1 1]
32 | [1 1 1 1]
33 |
34 | 1 - Iterations
35 |
```