ML ASSIGNMENT : 9
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Semester 5

Introduction

We are given set A and B as follows,

Set A:
- X1 = [1 1 1 1 1 1]
- X2 = [-1 -1 -1 -1 -1 -1]
- X3 = [1 -1 -1 1 1 1]
- X4 = [1 1 -1 -1 -1 -1]

Set B:
- Y1 = [1 1 1]
- Y2 = [-1 -1 -1]
- Y3 = [-1 1 1]
- Y4 = [1 -1 1]

We are to use BAM algorithm, to train a Weight matrix for BAM which can retrieve all the above mentioned 4 pairs.

Further, test the level of weight corrections of the BAM with examples.

There are three main steps to construct the BAM model.

- For learning, our weight matrix will be W = $\sum$ X$_i$ .T *Y$_i$.

- Testing on input patterns(set A) we have the equation,

$$Y_m = \text{sign}\left(W^T X_m\right), \quad m = 1.2, \ldots, M$$

- Testing on target patterns (Set B) using equation,

$$X_m = \text{sign}\left(W Y_m\right), \quad m = 1.2, \ldots, M$$

Results

Our weight matrix.

```
The weight matrix is :
[[2 2 4]
 [4 0 2]
 [2 2 0]
 [0 4 2]
 [0 4 2]
 [0 4 2]]
```

Our test on input pattern gives us Y's which exactly match the set B.

```
Y for input  0  :
[[1]
 [1]
 [1]]

Y for input  1  :
[[-1]
 [-1]
 [-1]]

Y for input  2  :
[[-1]
 [ 1]
 [ 1]]

Y for input  3  :
[[ 1]
 [-1]
 [ 1]]
```

Our test on output patterns gives us X's which exactly match set A. Thus we can conclude that the weights are exactly right for our model.

```
X for output  0  :
[[1]
 [1]
 [1]
 [1]
 [1]
 [1]]

X for output  1  :
[[-1]
 [-1]
 [-1]
 [-1]
 [-1]
 [-1]]

X for output  2  :
[[ 1]
 [-1]
 [-1]
 [ 1]
 [ 1]
 [ 1]]

X for output  3  :
[[ 1]
 [ 1]
 [-1]
 [-1]
 [-1]
 [-1]]
```