training pattern.

$$W_i(new) = W_i(old) + \alpha t x_i$$
$$b(new) = b(old) + \alpha t.$$

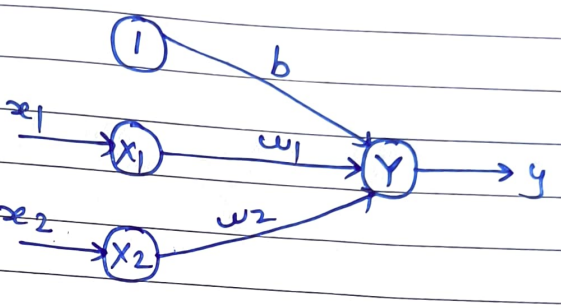
Example No.1

1. Implement AND function using perceptron network for bipolar input and target

→

Truth table.

x_1	x_2	t
1	1	1
1	-1	-1
-1	1	-1
-1	-1	-1



The ~~n/w~~ input pattern are presented to the n/w one by one, when all four input pattern are presented then one epoch is said to be completed.

The initial weights → $w_1 = w_2 = 0$
The initial bias → $b = 0$
The initial threshold → $\theta = 0$
The initial learning rate → $\alpha = 1$

Case①. For first i/p pattern

$x_1 = 1$, $x_2 = 1$, $t = 1$

$w_1 = w_2 = b = 0$.

Step① : Net input $y_{in} = x_1 w_1 + x_2 \cdot w_2 + b$

$= (1 \times 0) + (1 \times 0) + 0$

$= 0$

Step ②: The output y is computed by applying activation over the net input calculated.

$$Y = F(y_{in}) = 1 \text{ if } y_{in} > 0$$
$$= 0 \text{ if } y_{in} = 0$$
$$= -1 \text{ if } y_{in} < 0$$

Here, o/p $y = 0$ since $y_{in} = 0$

Now, target $(t) = 1$

$\therefore t \neq y$

Step ③.

Hence, we need to update the weights and bias.

$w_1(new) = w_1(old) + \alpha t x_1$

$= 0 + (1)(1)(1)$

$= 1$

$w_2(new) = w_2(old) + \alpha t x_2$

$= 0 + (1)(1)(1)$

$= 1$

$b(new) = b(old) + \alpha t$

$= 0 + (1)(1)$

$= 1$

Case ② Second pair of s:t

$x_1 = 1 \quad x_2 = -1, \quad t = -1$

$w_1 = w_2 = b = 1$

Step ① $y_{in} = x_1 w_1 + x_2 . w_2 + b$

$= (1 \times 1) + (-1)(1) + 1$

$= 1$

Step ② Apply activation functh.
here, o/p $y = 1$ since $y_{in} > 0$
Now, $t = -1$, $\therefore y \neq t$.

Step ③ Now update the weights.
$w_1(new) = w_1(old) + \alpha t x_1$.
$= 1 + (1)(-1)(1) = 0$

$w_2(new) = w_2(old) + \alpha t x_1$
$= 1 + (1)(-1)(-1) = 2$

$b(new) = b(old) + \alpha t$
$= 1 + (1)(-1) = 0$

Case ③ Third input pair of s:t
$x_1 = -1$, $x_2 = 1$, $t = -1$
$w_1 = 0$, $w_2 = 2$, $b = 0$

Step ① Net I/p $y_{in} = x_1 \cdot w_1 + x_2 \cdot w_2 + b$
$= (-1)(0) + (1)(2) + 0$
$= 2$

Step ② ~~Net i/p y_{in}~~ By applying activation function
here $y = 2$ since $y_{in} > 0$
Now, $t = 1$ and $\therefore y \neq t$

Step ③, Hence, updation of weights required,
$w_1(new) = w_1(old) + \alpha t x_1$
$= 0 + (1)(-1)(-1) = 1$

$w_2(new) = w_2(old) + \alpha t x_2$
$= 2 + (1)(-1)(1) = 1$

$b(new) = b(old) + \alpha t$
$= 0 + (1)(-1) = -1$

Case ④ Fourth pair of S:t

$x_1 = -1 \quad x_2 = -1 \quad t = -1$
$w_1 = 1 \quad w_2 = 1 \quad b = -1$

Step ① Net i/p $y_{in} = x_1 \cdot w_1 + x_2 \cdot w_2 + b$
$= (1)(-1) + (1)(-1) + (-1)$
$= -3$

Step ② By applying activation function,
Here, o/p $y = -1$ Since $y_{in} < 0$
Now, $t = -1$ and $y = -1$
so $y = t$

∴ No updation of weight and bias
$w_1(new) = w_1(old) = 1$
$w_2(new) = w_2(old) = 1$
$b(new) = b(old) = -1$

Here, first Epoch is completed.

Similarly, we have to complete second epoch.

Epochs	Inputs			Target	Net i/P	Calculated	Updated weights & bias		
	x_1	x_2	1	t	(yin)	o/p	w_1	w_2	b
	1	1	1	1	0	0	1	1	1
	1	-1	1	-1	1	1	0	2	0
	-1	1	1	-1	2	1	1	+1	-1
①	-1	-1	1	-1	-3	-1	1	1	-1
	1	1	1	1	1	1	1	1	-1
	1	-1	1	-1	-1	-1	1	1	-1
②	-1	1	1	-1	-1	-1	1	1	-1
	-1	-1	1	-1	-3	-1	1	1	-1

Example No. 2

2. Implement OR function using perceptron networks for bipolar inputs and bipolar targets.

→

Truth table

x_1	x_2	t
1	1	1
1	-1	1
-1	1	1
-1	-1	-1

Case ① First input pair

$x_1 = 1 \quad x_2 = 1 \quad t = 1$

$w_1 = w_2 = b = 0$

Step ① Net i/p $y_{in} = x_1 \cdot w_1 + x_2 \cdot w_2 + b$

$= (1)(0) + (1)(0) + 0$

$= 0$

Step ② ~~Net i/p y_{in}~~ Apply activation function

Here, o/p = $y = 1$ Since $y_{in} > 0$

Now, $t = 1$ and $y_{in} = 1$ $\therefore t = y$

Step ③ No need to weight updation.

$w_1(new) = w_1(old) = 1$

$w_2(new) = w_2(old) = 1$

$b(new) = b(old) = 1$

Case ② $x_1 = -1 \quad x_2 = 1 \quad b = 1 \quad t = 1$

$w_1 = w_2 = 1$

Step ① Net i/p $y_{in} = x_1 w_1 + x_2 \cdot w_2 + b$
$= (1)(-1) + (1)(1) + 1$
$= 1$

Step ② Apply activation function.
Here · $y = 1$ since $y_{in} > 0$
now $t = 1$ and $y = 1$
$\therefore t = y$

Step ③ No need updation of weights.
$w_1(new) = w_1(old) = 1$
$w_2(new) = w_2(old) = 1$
$b(new) = b(old) = 1$

Case ④ $x_1 = -1$, $x_2 = -1$, $t = -1$
$w_1 = w_2 = b = 1$

Step ① Net i/p · $y_{in} = x_1 w_1 + x_2 \cdot w_2 + b$
$= (1)(-1) + (-1)(1) + (1)$
$= -1$

Step ② Apply activation function
Here, $y = -1$ since $y_{in} \leq 0$
now, $t = -1$, $y = -1$

Step ③ No need to weight updation.
$w_1(new) = w_1(old) = 1$
$w_2(new) = w_2(old) = 1$
$b(new) = b(old) = 1$

$\therefore$ Here first epoch is completed.

Similarly, we have to complete second epoch

Epochs	Inputs			Target	Net i/p	Calculated	Updated weigh & bias		
	x_1	x_2	1	t	Yin	o/p	w_1	w_2	b
	1	1	1	1	0	0	1	1	1
①	1	-1	1	1	1	1	1	1	1
	-1	1	1	1	1	1	1	1	1
	-1	-1	1	-1	-1	-1	1	1	1
	1	1	1	1	3	1	1	1	1
②	1	-1	1	1	1	1	1	1	1
	-1	1	1	1	1	1	1	1	1
	-1	-1	1	-1	-1	-1	1	1	1

Conclusion:-

We have implemented perceptron network for AND and OR logic.

1. What is confussion matrix?

→ A confussion matrix is a technique for summarizing the performance of a classification algorithm.

2. Give examples of supervised learning algorithms.

→ Some of the most common algo. in Supervised Learning include support vector Machine (SVM), Logistic, Regressive, Naive Bayes, Neural Networks, k-nearest neighbour (KNN), and random forest.

3. Write a short note on perceptron network.

→ Perceptron is understood as an Artificial Neuron or neural n/w unit that helps to detect certain i/p data computations in business intelligence.

It is one of the best and simplest types of Artificial Neural Networks. However it is a supervised learning algo. of binary classifiers. Hence, we can consider it as a single-layer neural network with four main parameters. i.e. i/p values, weights ~~with four main parameters~~ and bias, net sum and an activation function.