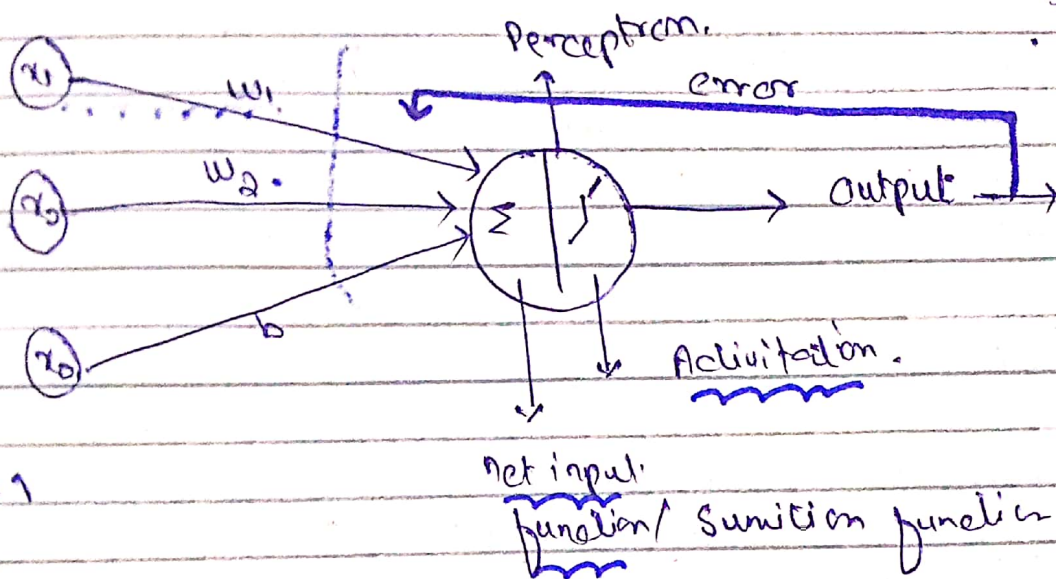


ANN (Artificial Neural Network)

Single perceptron

MLP.

Inputs



Forward pass

Backward pass.

Σ /

weights updation.

→ Handles only binary values.

Implementation of single perceptron using

OR AND NOR NAND XOR XNOR using

x_1	x_2	AND	OR	NAND	NOR	XOR	XNOR
0	0	0	0	1	1	0	1
0	1	0	1	1	0	1	0
1	0	0	1	1	0	1	0
1	1	1	1	0	0	0	1

$$w_1 = w_2 = b = 0$$

AND Gate

Learning rate: η

$$\leftarrow \eta = 1$$

x_1	x_2	$T \rightarrow$ target Output
-1	0	0
-1	0	0
1	-1	0
1	1	1
1	0	0

Question

• if truth table Reversed (?)

For Pattern (1)

Forward pass, in case of error Backward pass.

1) Formula for y_{in}

$$y_{in} = (x_1)w_1 + (x_2)w_2 + (x_0)b$$

$$-1(0) + -1(0) + 1(0)$$

$$= 0 \approx -1$$

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

$$= 0$$

2) Formula for $f(y_{in})$

$$y_{in} < 1 = -1$$

$$y_{in} > 1 = 1$$

$$y_{in} = 0 = -1$$

$$f(y_{in}) = -1 \quad \checkmark$$

$$T = -1$$

For Pattern 0

$$a) \rightarrow y_{in} = (x_1)(w_1) + (x_2)(w_2) + x_0(b)$$

$$y_{in} = 0(0) + (1)(0) + 1(0)$$

$$y_{in} = 0$$

$$b) \rightarrow f(y_{in}) = -1 \quad \boxed{\tau = -1}$$

For Pattern 3

$$a) \rightarrow y_{in} = 1(0) + (0)(0) + (1)(0)$$

$$= 0$$

$$b) \rightarrow f(y_{in}) = -1 \quad \boxed{\tau = -1}$$

For Pattern 4

$$a) \rightarrow y_{in} = (1)(0) + (1)(0) + (1)(0)$$

$$= 0$$

$$\boxed{\tau = 1}$$

error.

$$b) \rightarrow f(y_{in}) = \boxed{-1}$$

Backward Pass.

$$\underline{w_1} = w_{1(\text{old})} + \alpha(\tau)(x_1)$$

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

$$= 1$$

$$\underline{b} = b_{(\text{old})} + \alpha \tau x_0$$

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

$$b = 1$$

new.

$$\underline{w_2} = w_{2(\text{old})} + \alpha(\tau)(x_2)$$

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

$$= 1$$