ADALINE – Adaptive Linear Network

ADALINE network

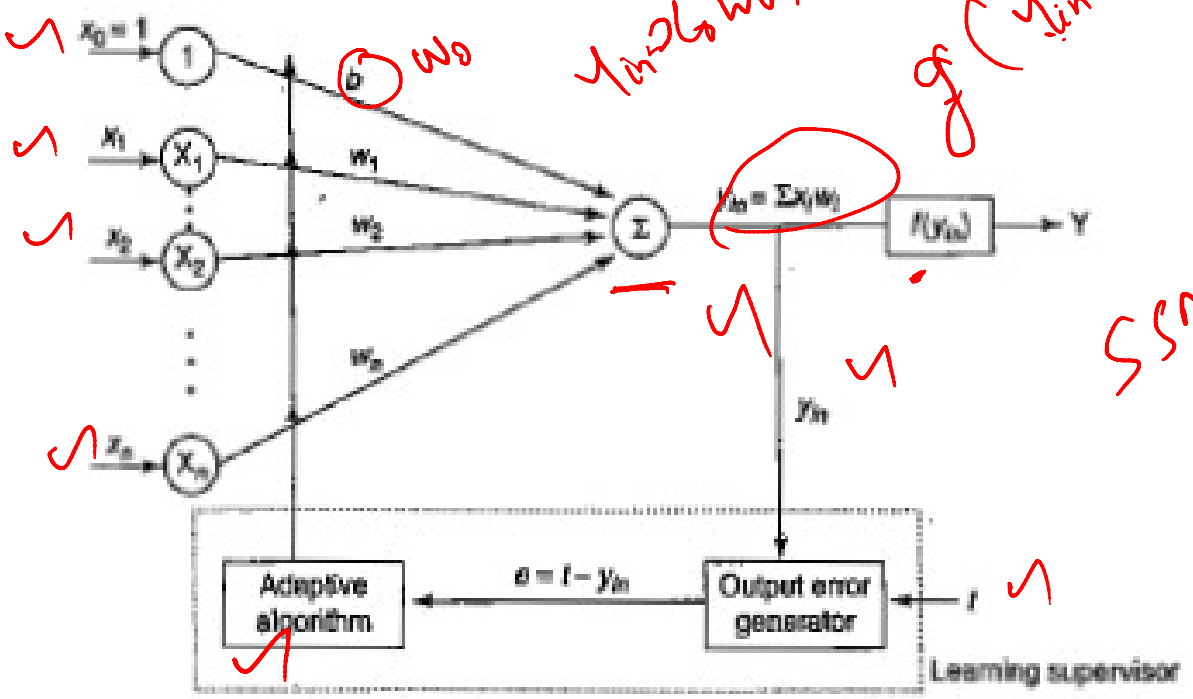
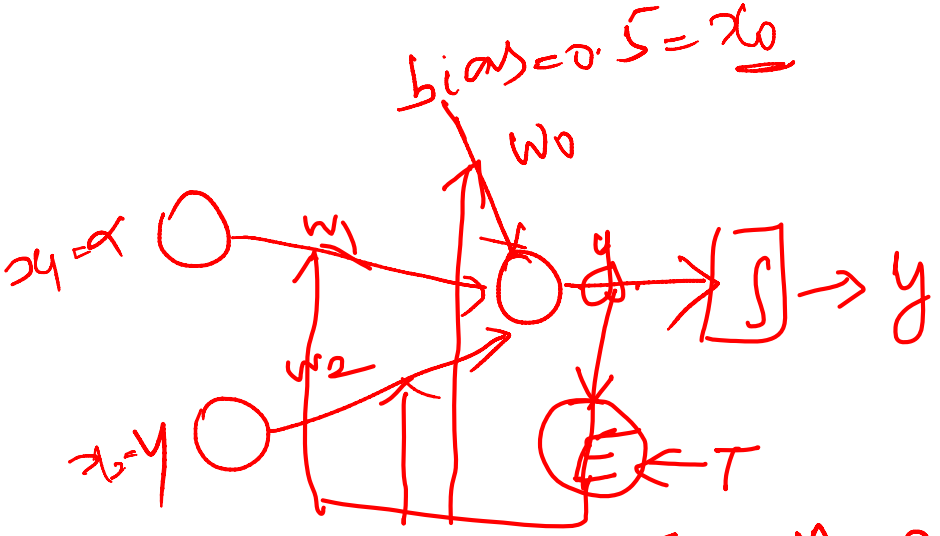


Figure 3-5 Adaline model.

OR function:

x	y	T
1	1	1
1	-1	1
-1	1	1
-1	-1	-1

(1, 1)



$w_0 = w_1 = w_2 = 0.5$ $\eta = 0.1$

Epoch 1:

$y_j = 0.5 \times 0.5 + 1 \times 0.5 + 1 \times 0.5$

$= 0.25 + 0.5 + 0.5 = 1.25$

$Error = (T - y_j)^2 = (1 - 1.25) = (-0.25)^2 = 0.0625$

update the weights:

new weight $= w_i + \eta (t - y_i) \cdot x_i$

$w_0 = 0.5 + 0.1 (-0.25)\ 0.5 = 0.4875$

$w_1 = 0.5 + 0.1 (-0.25)\ 1 = 0.475 = w_2$

x_1 x_2

$(1, -1)$ $[0.4875 \quad 0.475 \quad 0.475]$

$x_0 = 0.5$ $\quad w_0 \quad w_1 \quad w_2$

$$y_j = 0.5 \times 0.4875 + 1 \times 0.475 + (-1) \times 0.475$$

$$= 0.244$$

$$\text{Error} = (1 - 0.244)^2 = (0.756)^2 = 0.571$$

update weights

$$w_0 = 0.4875 + 0.1 \times (0.756) \times 0.5 = 0.5253$$

$$w_1 = 0.475 + 0.1 \times (0.756) \times 1 = 0.551$$

$$w_2 = 0.475 + 0.1 \times (0.756) \times (-1) = 0.399$$

x_1 x_2 $(-1, 1)$ $x_0 = 0.5$

$[0.5253 \quad 0.551 \quad 0.399]$ $\quad \eta = 0.1$

$w_0 \quad w_1 \quad w_2$

$y_j = 0.5 \times 0.5253 + (-1) \times 0.551 + 1 \times 0.399$

$= 0.1106 \approx 0.111$

$\text{Error} = (1 - 0.111)^2 = (0.889)^2 = 0.7903 \approx 0.790$

$w_0 = 0.5353 + 0.1 \times 0.889 \times 0.5 = 0.5697 \approx 0.57$

$w_1 = 0.551 + 0.1 \times 0.889 \times (-1) = 0.462$

$w_2 = 0.399 + 0.1 \times 0.889 \times 1 = 0.4879$

≈ 0.488

x_1 x_2

$(-1, -1)$

$t_0 = 0.5$

$[0.570 \quad 0.462 \quad 0.488]$

$w_0 \quad w_1 \quad w_2$

$\eta = 0.1$

Epoch	x	y	t	y_j	Error	w_0	w_1	w_2
					①			
					②			
					③			
					④			
					Σ			

(1)