PAIML ASSIGNMENT 1

SUBMITTED BY : SHUCHIKA SHARMA
ROLL NO : 24901325

Ques Design Adaline Network for below. Consider LMS = 0.95 & $\mu = 0.25$

x_1	x_2	y
1	1	1
1	-1	-1
-1	1	-1
-1	-1	-1

Ans

⇒ Eqn's to be used are :

$$y_{in} = w_1 x_1 + w_2 x_2 + B$$

$$w_{1new} = w_{1old} + (T - y_{in})\, x_1\, \mu$$

$$w_{2new} = w_{2old} + (T - y_{in})\, x_2\, \mu$$

$$B_{new} = B_{old} + (T - y_{in})\, \mu$$

	x_1	x_2	b	T	y_{in}	$T - y_{in}$	$(T-y_{in})^2$	w_1	w_2	B
I_1	1	1	1	1	0.3	0.7	0.49	0.1	0.1	0.1
I_2	+1	-1	1	-1	0.275	-1.275	1.625	0.275	0.275	0.275
I_3	-1	1	1	-1	0.594	-1.594	2.541	-0.044	0.594	-0.044
I_4	-1	-1	1	-1	-0.993	-0.007	≅ 0	0.355	0.196	-0.442

$$E_i = \Sigma (T - y_{in})^2 = 0.49 + 1.625 + 2.541 + 0 = 4.065 \neq 0.95$$

Since it does not match the given LMS, hence we perform another iteration

	x_1	x_2	b	T	y_{in}	$T - y_{in}$	$(T-y_{in})^2$	w_1	w_2	B
I_1	1	1	1	1	0.111	0.889	0.7903	0.357	0.198	-0.444
I_2	1	-1	1	-1	-0.061	-0.939	0.881	0.58	0.42	-0.221
I_3	-1	1	1	-1	-0.146	-0.854	0.729	0.845	0.695	-0.456 ~~-0.00075~~
I_4	-1	-1	1	-1	-1.67	0.67	0.449	0.559	0.442	-0.669

$\therefore E_i = 2.858 \neq 0.95$

x_1	x_2	B	T	y_{in}	$(T-y_{in})$	$(T-y_{in})^2$	w_1	w_2	B
1	1	1	1	0.164	0.836	0.698	0.391	0.273	−0.5
1	−1	1	−1	−0.173	−0.827	0.684	0.6	0.482	−0.291
−1	1	1	−1	−0.202	−0.798	0.636	0.393	0.689	−0.498
−1	−1	1	−1	−1.785	0.785	0.616	0.593	0.494	−0.698

$\therefore E_i = 0.698 + 0.684 + 0.636 + 0.616$
$= 2.634$

x_1	x_2	B	T	y_{in}	$(T-y_{in})$	$(T-y_{in})^2$	w_1	w_2	B
1	1	1	1	0.194	0.806	0.649	0.397	0.298	−0.501
1	−1	1	−1	−0.202	−0.798	0.636	0.596	0.499	−0.299
−1	1	1	−1	−0.198	−0.802	0.643	0.397	0.698	−0.499
−1	−1	1	−1	−1.793	0.793	0.628	0.598	0.496	−0.699

$\therefore E_i = 2.556$

⇒ Trying for $\mu = 0.75$

x_1	x_2	b	T	y_{in}	$(T-y_{in})$	$(T-y_{in})^2$	w_1	w_2	B
1	1	1	1	0.197	0.802	0.64	0.399	0.299	−0.501
1	−1	1	−1	−0.199	−0.8	0.64	0.6	0.499	−0.30
−1	1	1	−1	−0.201	−0.799	0.639	0.4	0.699	−0.5
−1	−1	1	−1	−1.799	0.799	0.639	0.599	0.499	−0.7001

$E_i = 2.558$

The stopping criteria cannot be achieved using the given value of μ. Hence, optimal solution can be achieved using a different μ..