

Assignment - 15

⇒ Develop a simple linear regression model using RMS prop optimiser.

Sample (i)	x_i	y_i
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

Do manual calculations for 2 iterations with 1st 2 samples.

2) Step-1: (X, y) , epoch = 2, $m = 1$, $c = -1$, $\gamma = 0.9$,
 $\eta = 0.1$, $E_m = E_c = 0$, $\epsilon = 10^{-8}$.

Step-2: $iter = 1$

Step-3: sample = 1

Step-4: $J_m = -(3.4 - (1)(0.2) + 1)(0.2) = -0.84$

$$J_c = -(3.4 - (1)(0.2) + 1) = -4.2$$

Step-5: $E_m = (0.9)(0) + (1-0.9)(-0.84)^2 = 0.07$

$$E_c = (0.9)(0) + (1-0.9)(-4.2)^2 = 1.764$$

Step-6: $\Delta m = \frac{-0.1}{\sqrt{0.07 + 10^{-8}}} \times -0.84 = 0.31$

$$\Delta c = \frac{-0.1}{\sqrt{1.764 + 10^{-8}}} \times -4.2 = 0.31$$

step-7: $m = m + \Delta m = 1 + 0.31 = 1.31$

$c = c + \Delta c = -1 + 0.31 = -0.69$

step-8: $\text{sample} = \text{sample} + 1 = 1 + 1 = 2$

step-9: $\text{if}(\text{sample} > \text{ns})$
 $2 > 2$ false
 go to step-4

step-4: $g_m = -(3.8 - (1.31)(0.4) + 0.69) \cdot 0.4 = -1.5$

$g_c = -(3.8 - (1.31)(0.4) + 0.69) = -3.9$

step-5: $E_m = 0.9(0.07) + (0.1)(-1.5)^2 = 0.28$

$E_c = (0.9)(1.76) + (0.1)(-3.9)^2 = 3.1$

step-6: $\Delta m = \frac{-0.1}{\sqrt{0.28 + 10^{-8}}} \times -1.5 = 0.28$

$\Delta c = \frac{-0.1}{\sqrt{3.1 + 10^{-8}}} \times -3.9 = 0.22$

step-7: $m = 1.31 + 0.28 = 1.59$

$c = -0.69 + 0.22 = -0.47$

step-8: $\text{sample} = 2 + 1 = 3$

step-9: $\text{if}(\text{sample} > \text{ns})$
 $3 > 2$ True
 go to next step
 (step-10)

step-10: $iter = iter + 1 = 1 + 1 = 2$

step-11: $\text{if}(iter > epoch)$
 $2 > 2$ false

go to step-3

step-3: $sample = 1$

step-4: $g_m = -(3.4 - (1.59)(0.2) + 0.47)(0.2) = -0.7$

$g_c = -(3.4 - (1.59)(0.2) + 0.47) = -3.5$

step-5: $E_m = (0.9)(0.28) + (0.1)(-0.7)^2 = 0.3$

$E_c = (0.9)(3.1) + (0.1)(-3.5)^2 = 4.0$

step-6: $\Delta m = \frac{-0.1}{\sqrt{0.3 + 10^{-8}}} \times -0.7 = 0.12$

$\Delta c = \frac{-0.1}{\sqrt{4 + 10^{-8}}} \times -3.5 = 0.19$

step-7: $m = 1.59 + 0.12 = 1.71$

$c = -0.47 + 0.19 = -0.3$

step-8: $sample = 1 + 1 = 2$

step-9: $\text{if}(sample > ns)$
 $2 > 2$ false
 (go to step-4)

step-4: $g_m = -(3.8 - (1.91)(0.4) + 0.3)0.4 = -1.4$

$g_c = -(3.8 - (1.91)(0.4) + 0.3) = +3.6$

step-5: $E_m = (0.9)(0.3) + (0.1)(-1.4)^2 = 0.46$

$E_c = (0.9)(4.0) + (0.1)(-3.6)^2 = 4.89$

step-6: $\Delta m = \frac{-0.1}{\sqrt{0.46 + 10^{-8}}} \times -1.4 = 0.2$

$\Delta c = \frac{-0.1}{\sqrt{4.89 + 10^{-8}}} \times 3.6 = 0.16$

step-7: $m = 1.91 + 0.2 = 1.91$

$c = -0.3 + 0.16 = -0.14$

step-8: sample = 2 + 1 = 3

step-9: if (sample > ns)

3 > 2 True

go to next step

(step-10)

step-10: iter = 2 + 1 = 3

step-11: if (iter > epochs)

3 > 2 True

go to next step

(step-12)

step-12: m = 1.91

c = -0.14