

ASSIGNMENT-15

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Let us consider a sample dataset have one input (x_i^a) and one output (y_i^a) and no. of samples 2. Develop a simple linear regression model using RMS prop optimizer

sample (i)	x_i^a	y_i^a
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 first two samples.

Step - 1: $[x, y]$, $\eta = 0.1$, epochs = 2, $m = 1$, $c = -1$, $\gamma = 0.9$, $E_m = E_c = 0$, $\epsilon = 10^{-8}$

Step - 2: itr = 1

Step - 3: sample = 1

$$\text{step - 4: } g_m = -(3.4 - (1)(0.2) + 1)(0.2) = -0.84$$

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

$$\text{step - 5: } E_m = (0.9)(0) + (1 - 0.9)(-4.2)^2 = 1.764$$

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

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

$$\text{Step - 7: } m = m + \Delta m = 1 + 0.31 = 1.31$$

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

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

$$= 1 + 1 = 2$$

step - 9: if (sample > ns) goto step-10

2 > 2

else

goto step-4

$$\text{Step-4: } q_m = -(3.8 - (1.31)(0.4) + 0.69) 0.4 = -1.5$$

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

$$\text{Step-5: } E_m = (0.9)(0.07) + (0.1)(-1.5)^2 = 0.28$$

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

$$\text{Step-6: } \Delta m = \frac{-0.1}{\sqrt{0.28 + 10^{-8}}} * 1.5 = 0.28$$

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

$$\text{Step-7: } m = m + \Delta m = 1.31 + 0.28 = 1.59$$

$$c = c + \Delta c = -0.69 + 0.22 = -0.47$$

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

$$= 2 + 1 = 3$$

step-9: if (sample > ns) goto step-10

3 > 2

else

step-4

$$\text{Step-10: } \text{itr} = \text{itr} + 1$$

$$= 1 + 1 = 2$$

Step-11: if (itr > epochs)

goto step-12

else

goto step-3

$$\text{Step-3: } \text{sample} = 1$$

$$\text{step-4: } g_m = -(3.4 - (1.59)(0.2) + 0.47)(0.2) = -0.7$$

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

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

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

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

$$\Delta c = \frac{-0.1}{\sqrt{4.0 + 10^{-8}}} * -3.5 = 0.17$$

$$\text{step-7: } m = m + \Delta m = 1.59 + 0.12 = 1.71$$

$$c = c + \Delta c = -0.47 + 0.17 = -0.3$$

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

$$= 1 + 1 = 2$$

$$\text{step-9: if (sample} > \text{ns)}$$

$$2 > 2$$

go to step-10

else

go to step-4

$$\text{step-4: } g_m = -(3.8 - (1.71)(0.4) + 0.3) * 0.4 = -1.4$$

$$g_c = -(3.8 - (1.71)(0.4) + 0.3) = -3.6$$

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

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

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

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

$$\text{step-7: } m = m + \Delta m = 1.71 + 0.2 = 1.91$$

$$c = c + \Delta c = -0.3 + 0.16 = -0.14$$

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

$$= 2 + 1$$

$$= 3$$

$$\text{step-9: if (sample} > \text{ns)}$$

$$3 > 2$$

go to step-10

else

goto step-4

$$\text{step-10: itr} = \text{itr} + 1$$

$$= 2 + 1$$

$$= 3$$

$$\text{step-11: if (itr} > \text{epoches)}$$

$$3 > 2$$

goto step-12

else

goto step-3

$$\text{step-12: } m = 1.91$$

$$c = -0.14$$