ASSIGNMENT =

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Let us consider a sample dataset have input (x_i) and one out (y_i) and number of samples 2. Develop a simple linear regression model using RMS prop optimizer

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

Step-1 : [x, y], $\eta = 0.1$, epochs = 2, m=1, c=1

$\beta = 0.9$, $E_m = E_c = 0$, $\varepsilon = 10^{-8}$

Step-2 : itr = 1

Step-3 : sample = 1

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

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

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 : $\Delta m = \frac{-0.1}{\sqrt{0.07 + 10^{-8}}} (-0.84) = 0.31$

$$\Delta c = \frac{-0.1}{\sqrt{1.76 + 10^{-8}}}(-0.2) = 0.31$$

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

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

Step-8: sample = sample + 1 = 1 + 1 = 2

Step-9: if (sample > n_s) go to step-10

else

go to step-4

Step-4: $g_m = -(3.8 - (1.31)(0.4) + 0.69)0.4 = -1.5$

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

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: $\Delta m = \frac{-0.1}{\sqrt{0.28 + 10^{-8}}}(-1.5) = 0.28$

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

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

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

Step-8: sample = sample + 1 = 2 + 1 = 3

Step-9: if (sample > n_s) go to step-10

else

go to step-4

Step-10: itr = itr + 1

= 1 + 1 = 2

Step-11: if (itr > epochs)

go to step-12

else

go to step-3

Step-3: sample = 1

Step-4: $g_m = -(3.4 - (1.59)(0.2) + 0.47)(0.1)$

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

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: $\Delta m = \frac{-0.1}{\sqrt{0.3 + 10^{-8}}}(-0.7) = 0.12$

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

Step-7: $m = m + \Delta m = 1.59 + 0.12 = 1.71$

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

Step-8: Sample = sample + 1 = 1 + 1 = 2

Step-9: if (sample > n_s)

go to step-10

else

go to step-4

Step-4 : $g_m = -(3.8 - (1.71)(0.4) + 0.3)(0.4) = -1.4$

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

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 : $\Delta m = \frac{-0.1}{\sqrt{0.46 + 10^{-8}}}(-1.4) = 0.2$

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

Step-7 : $m = m + \Delta m = 1.71 + 0.2 = 1.91$

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

Step-8 : sample = sample + 1 = 2 + 1 = 3

Step-9 : if (sample > n_s)

go to step-10

else

go to step-4

Step-10 : itr = itr + 1 = 2 + 1 = 3

Step-11 : if (itr > epochs)

3 > 2

go to step-12

else

go to step-3

Step-12 : $m = 1.91$, $c = -0.14$