Assignment - 13

18K41A0515

Let us consider a sample dataset have one input (x_i^a) and one input (y_i^a) and number of sample 4. Develop a simple linear regression model using ADA GRAD 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], epochs = 2, m = 1, c = -1, gm = 0. gc = 0,

$\eta = 01, \varepsilon = 10^{-8}$.

step 2:- itr = 1

step 3: sample = 1

step4: $gm = -(3.4 - (1)(0.2)+1)0.2 = -0.84$

$gc = -(3.4) - (1)(0.2)+1) = -4.2$.

step 5: $gm = 0 + (-0.84)^2 = 0.7056$

$gc = 0 + (-4.2)^2 = 17.67$

step6: $\Delta m = \frac{-\eta}{\sqrt{gm + \varepsilon}} gm$

$= \frac{-(0.1)}{\sqrt{0.7056+10^{-3}}} * -0.84$

$\Delta C = \frac{-(0.1)}{\sqrt{17.64+10^{-8}}} * -4.2$

$= 0.09$

Step7: $m = m + \Delta m = 1.00 + 0.09 = 1.09$

$C = c + \Delta c = -1 + 0.09 = -0.91$

Step 8: sample = sample + 1

$= 1 + 1$

$= 2$

Step9: if (sample > ns) goto step-10

2 > 2

else

step-4

Step-4: $g_m = -(3.8 - (1.09)(0.4) + (0.9) \cdot 0.4 = -1.7$

$g_c = -(3.6 - (1.09)(0.4) + 0.91) = -4.27$

Step5: $G_m = 0.7056 + (-1.7)^2 = 3.59$

$G_c = 19.64 + (-4.27)^2 = 35.87$

Step6: $\Delta m = \frac{-0.1}{\sqrt{3.57+10^{-8}}} * -1.7 = 0.08$

$\Delta C = \frac{-0.1}{\sqrt{35.87+10^{-8}}} * -4.27 = 0.07$

Step7: $m = m + \Delta m = 1.09 + 0.08 = 1.17$

$c = c + \Delta C = -0.91 + 0.07 = -0.8$

Step8: sample = sample + 1

$= 2 + 1 = 3$

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

3 > 2

else

goto step 4

Step 10: itr = itr + 1

= 1 + 1 = 2

Step 11: if (itr > epochs) goto step 12

2 > 2

else

goto step 3

Step 3: = sample = 1.

Step 4: $g_m = -(3.4 - (1.17)(0.2) + 0.84) \cdot 2 = -0.80$

$g_c = -((3.4) - (1.17)(0.2) + (0.84) = -4.0$

Step 5: $G_m = 3.59 + (-0.80)^2 = 4.23$

$G_c = 35.89 + (-4.0)^2 = 51.89$

Step 6: $\Delta m = \frac{-0.1}{\sqrt{4.23 + 10^{-8}}} * -0.80 = 0.038$.

$\Delta c = \frac{-0.1}{\sqrt{51.89 + 10^{-8}}} * -4.0 = 0.05$

Step 7: $m = m + \Delta m = 0.038 + 1.17 = 1.208$

$c = c + \Delta c = -0.84 + 0.05 = -0.79$

Step 8: sample = sample + 1

1 + 1 = 2

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

2 > 2

else

goto step 4.

Step 4: $g_m = -(3.8 - (1.20)(0.4) + 0.79) * 0.4 = -1.64$

$g_c = -(3.8 - (1.20)(0.4) + 0.79) = -4.41$

Step 5: $G_m = 4.23 + (-1.64)^2 = 6.9$

$G_c = 51.89 + (-4.11)^2 = 68.7$

Step 6: $\Delta m = \frac{-0.1}{\sqrt{6.9 + 10^{-8}}} * -1.64 = 0.06$

$\Delta c = \frac{-0.1}{\sqrt{6.8 + 7 + 10^{-8}}} * -4.11 = 0.04$

Step 7: $m = m + \Delta m = 1.208 + 0.06 = 1.26$

$c = c + \Delta c = -0.79 + 0.04 = -0.75$

Step 8: sample = sample + 1

$= 2 + 1 = 3$

Step 9: if (sample > ns)

3 > 2

goto step-10

else

goto step-4

step-10: itr = itr + 1

$= 2 + 1 = 3$

step-11: if (itr > epochs)

3 > 2 goto step-12

else

goto step-3

Step 12 $m = 1.26$

$c = -0.75$