Assignment - 13

18K41A0545

2) 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 ADAGRAD 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 2 samples

Step 1 :- $[x, y]$, epoches = 2, $m = 1$, $c = -1$, $g_m = 0$, $g_c = 0$

$\eta = 0.1$, $\varepsilon = 10^{-8}$

Step 2 :- $pto = 1$

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 :- $g_m = 0 + (-0.84)^2 = 0.7056$

$g_c = 0 + (-4.2)^2 = 17.64$

Step 6 :- $\Delta m = \dfrac{-\eta}{\sqrt{g_m + \varepsilon}}\, g_m$

$= \dfrac{-(0.1)}{\sqrt{0.7056 + 10^{-8}}} \cdot -0.84$

$$\Delta c = \frac{-(0.1)}{\sqrt{17.64 + 10^{-9}}} * -4.2$$

$$= 0.09$$

Step 7 :- $m = m + \Delta m = 1 0.09 = 1.09$

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

Step 8 :- Sample = sample + 1

$= 1 + 1$

$= 2$

Step 9 :- (Sample > n) goto step - 10

$2 > 2$

Step - 4

Step - 4 : $g_m = -(3 9 - (1.09)(0.4 + (0.9)\ 0.4 = -1.7$

$g_c = -(3.6 - (109)(0 4) + 0.91) = -4.27$

Step 5 :- $q_m = 0.7050 + (-1.7)^2 = 3.59$

$q_c = 17.64 + (-4.27)^2 = 35.87$

Step 6 :- $\Delta m = \frac{-0.1}{\sqrt{3.57 + 10^{-9}}} * -1.7 = 0.09$

$\Delta c = \frac{-0.1}{\sqrt{35.87 + 10^{-9}}} * -4.27 = 0.07$

Step 7 :- $m = m + \Delta m = 1.09 + 0.08 = 1.17$

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

Step 8 :- Sample = Sample + 1

$= 2 + 1$

$= 3$

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

3 > 2

else goto step-4

Step 10 :- ltr = ltr + 1

= 1 + 1

= 2

step 11 :- if (ltr > epoches) goto step-12

2 > 2

else goto step-3

step 3 = Sample = 1

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

$g_c = -(13.4) - (1.17)(0.2) + 10.84) = -4.0$

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 :- $g_m = -(3.6 - (1.20)(0.4) + 0.79) * 0.4 = -1.64$

$g_c = -(3.6 - (1.20)(0.4) + 0.79) = -4.41$

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

$G_c = 51.69 + (-4.41)^2 = 68.7$

step 6 :

$\Delta m = \frac{-0.1}{\sqrt{6.9 + 10^{-8}}} * -1.64 = 0.01$

$\Delta c = \frac{-0.1}{\sqrt{6.57 + 10^{-9}}} * -4.11 = 0.04$

step 7 :- $m = m + \Delta m = 1.208 + 0.061 = 1.2$

$c = c + \Delta c = -0.79 + 0.047 = -0.75$

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 > epoches)

$3 > 2$

goto step - 12

else goto step - 3

step 12 :- $m = 1.26$

$c = -0.75$