Assignment - 13

Let us consider a sample dataset have one i/p (x_i^a) and one output (y_i^a) and number of sample 4. Develop a simple linear regression model using ADAGRAD optimiser.

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 calculation for 2 iteration with first 2 samples

Step1: [x,y], epochs=2, m=1, c=-1, Gm=0, Gc=0, η=0.1,

$\epsilon = 10^{-8}$.

Step2: i=1

Step3: Sample=1

Step4: $g_m = -(3.4-(1)(0.2)+1)0.2 = -0.84$

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

Step5: $G_m = 0 + (-0.84)^2 = 0.7056$

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

Step6:

$$\Delta m = \frac{\eta}{\sqrt{G_m + \epsilon}} g_m$$

$$= \frac{-(0.1)}{\sqrt{0.7056+10^{-8}}} * -0.84 = 0.09$$

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

$$= 0.09$$

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 : if (Sample > n) goto step 10

$$2 > 2$$

@else

step 4

Step 4 : $g_m = -(3.8 - (1.09)(0.4) + 0.91)\,0.4 = -1.7$

$$g_c = -(3.8 - (1.09)(0.4) + 0.91) = -4.27$$

Step 5 : $G_m = 0.7056 + (-1.7)^2 = 3.59$

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

Step 6 : $\Delta m = \frac{-0.1}{\sqrt{3.59+10^{-8}}} * -1.7 = 0.08$

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

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

$c = c + \Delta c = -0.91 + 0.07 = -0.84$

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Step 8: Sample = Sample + 1 = 2 + 1 = 3

Step 9: if (Sample > ns) goto Step 10

3 > 2

else

goto Step 4

Step 10: iter = iter + 1 = 1 + 1 = 2

Step 11: if (iter > epoches) goto Step 12

2 > 2

else

goto Step 3

Step 3: Sample = 1

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

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

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:

$m = m + \Delta m = 0.038 + 1.A = 1.20\,8$

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

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

Step 9: if (Sample > ns) goto step 10
2 > 2

else
goto step 4

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

$g_c = -(3.8-(1.20)(0.4)+0.79) = -4.11$

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

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

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

$\Delta c = \frac{-0.1}{\sqrt{68.7+10^{-8}}} * -4.11 = 0.04$

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) goto step 10
3 > 2

else
goto step 4

step 10 : iter = iter+1 = 2+1 = 3

Step 11 : if (iter > epoches) goto step 12
3 > 2

else goto step 3

Step 12:

$m = 1.26$

$C = -0.75$ 11