Assignment- 13

ADAGRAD Optimizing technique

sample (i)	Xi	Yi
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

→ Manual Calculations.

Step1 :- $[x, y]$, $\eta = 0.1$, ep = 2, m = 1, c = 1

$G_m = G_c = 0$, $\varepsilon = 10^{-8}$

Step2 : it = 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 : $G_m = G_m + (g_m)^2$

$= 0 + (-0.84)^2$

$= 0.7056$

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

$= 17.64$;

Step 6 :-

$$\Delta m = \frac{-\eta}{\sqrt{\sigma_m + \varepsilon}} g_m$$

$$\Delta c = \frac{-\eta}{\sqrt{\sigma_c + \varepsilon}} g_c$$

$$\Delta m = \frac{-0.1}{\sqrt{0.705 + 10^{-8}}} (\bar{x} 0.84)$$

$$= -\frac{0.084}{0.836}$$

$$= +0.1$$

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

$$= \frac{-0.42}{4.2}$$

$$= +0.1$$

Step 7 :-

$$m = 1 + 0.1$$

$$= 1.1$$

$$c = -1 + 0.1$$

~~1 - 0.1~~

1 + 0.1

= 1.1

-1 + 0.1

= -0.9 ✓

Step 8 :- $s = 2$

Step 9 :- if $(s > n_s)$ go to next step

else go to step 4

Step 4 :- $g_m = -(3.8 - (1.1)(0.4) + 0.9)0.4$

$= -(4.7 - 0.44)0.4)$

$= -1.7$

$g_c = -4.26$

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

$= 3.59$

$G_c = 17.64 + (-4.26)^2$

$= 35.78$

Step 6 :- $\Delta m = \frac{-0.1}{\sqrt{3.59 + 35.78}}(-1.7)$

$= \frac{0.17}{1.89}$

$= 0.089$

$$\Delta C = \frac{-0.2}{\sqrt{35.71 + 20^2}} (-4.26)$$

$$= \frac{0.426}{5.98}$$

$$= 0.07 \checkmark$$

Step7 : $m = 1.1 + 0.089$

$$= 1.189 \checkmark$$

$$c = -0.9 + 0.07$$

$$= -0.83 \checkmark$$

Step8 :- $s = 3 > n_s$ go to next step

Step9 : $it = 2$

Step10 : if $(2 > 2)$ go to Step3.

Step3 : sample = 1

Step4 :- $g_m = -(3.4 - (1.189)(0.2) + 0.83)0.2$

$$= -\left(\frac{4.23 - 0.23}{4}\right) 0.2$$

$$= -0.8$$

$$g_c = -(3.4 - (1.189)(0.2) + 0.83)$$

$$= -4$$

Steps :- $G_m = .3.59 + (-0.8)^2$

$= 4.23$

$G_c = 35.78 + (-4)^2$

$= 51.78$

Steps :- $\Delta m = \frac{-0.1}{\sqrt{4.23 + 25^{-8}}} \times (-0.8)$

$= \frac{0.08}{2.056}$

$= 0.038$

$\Delta c = \frac{(-0.1)(-4)}{\sqrt{51.78 + 25^{-8}}}$

$= \frac{0.4}{7.195}$

$= 0.056$

Step7 : $m = 1.189 + 0.038 = 1.227$

$c = -0.83 + 0.056$

$= -0.774.$

Step 8 : $s = 2$

Step 9 : $2 > n_s$ go to step 4.

Step 4 ;

$$g_m = -(3.8 - (1.227)(0.4) + 0.774)0.4$$

$$= -(4.574 - 0.49)0.4$$

$$= -(4.084)(0.4)$$

$$= -1.633$$

$$g_c = -4.084$$

Step 5 :

$$G_m = 4.23 + (-1.633)^2$$

$$= 6.89$$

$$G_c = 51.78 + (4.084)^2$$

$$= 68.45$$

Step 6 :

$$\Delta m = \frac{-0.1}{\sqrt{6.89 + 68.45}} (-1.633)$$

$$= \frac{0.0633}{2.6248}$$

$$= 0.024$$

$$\Delta C = -\frac{(0.1)(-4.084)}{\sqrt{68.45 + 10^{-8}}}$$

$$= \frac{0.4084}{8.2734}$$

$$= 0.049$$

step 7 : $m = 1.227 + 0.024$

$$= 1.251$$

$$C = -0.774 + 0.049$$

$$= -0.725$$