

ASSIGNMENT-13

18F41A0536

→

ADAGRAD

Optimizing

Technique

Sample x_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

→ Manual calculations:

Step 1: $[x, y], \eta = 0.1, ep = 2, m = 1$
 $c = -1, G_m = G_c = 0, \epsilon = 10^{-8}$

Step 2: $t = 1$

Step 3: $sample = 1$

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

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

$$\begin{aligned}\text{step 5: } G_m &= G_m + (g_m)^2 \\ &= 0 + (-0.84)^2 \\ &= 0.7056\end{aligned}$$

$$\begin{aligned}G_c &= G_c + (g_c)^2 \\ &= 0 + (-4.2)^2 \\ G_c &= 17.64\end{aligned}$$

$$\text{Step 6: } \Delta m = \frac{-\eta}{\sqrt{G_m + \epsilon}} \times g_m$$

$$\Delta c = \frac{-\eta}{\sqrt{G_c + \epsilon}} \times g_c$$

$$\Delta m = \frac{-0.1}{\sqrt{0.7056 + 10^{-8}}} \times (-0.84)$$

$$\boxed{\Delta m = 0.1}$$

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

$$\boxed{\Delta c = 0.1}$$

$$\text{step 7: } m = m + \Delta m = 1 + 0.1 = 1.1$$

$$c = c + \Delta c = -1 + 0.1 = -0.9$$

Step 8: sample = 2

Step 9: if (2 > ns) go to next step
else go to step 4

$$\text{Step 4: } g_m = -(3.8 - (1.1)(0.4) + 0.9)0.4$$

$$= -(4.7 - 0.44)0.4$$

$$= -1.7$$

$$g_c = -4.26$$

$$\text{Step 5: } G_m = 0.7056 + (-1.7)^2$$
$$= 3.59$$

$$G_c = 17.64 + (-4.26)^2$$
$$= 35.78$$

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

$$\Delta m = \frac{0.17}{1.89} = 0.089$$

$$\Delta c = \frac{-0.1}{\sqrt{35.78 + 10^{-8}}} \times (-4.26)$$

$$\Delta c = 0.07$$

step 7: $m = 1.1 + 0.089$

$$= 1.189$$

$$c = -0.9 + 0.07$$

$$c = -0.83$$

step 8: $s = 3 > n$. goto next step

step 9: $it = 2$

step 10: if $(2 > 2)$ goto step 3

step 3: $g_{\text{sample}} = 1$

step 4: $g_m = -(3.4 - (1.189)(0.2) + 0.83)$
 0.2

$$g_m = -(4.23 - 0.23) \times 0.2$$

$$g_m = -0.8$$

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

$$g_c = -4$$

step 5: $h_m = 3.59 + (-0.8)^2$
 $= 4.23$

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

$$h_c = 51.78$$

$$\text{Step 6: } \Delta m = \frac{-0.1}{\sqrt{4.23 + 10^{-8}}} \times (-0.8)$$

$$\Delta m = 0.08 / 2.056$$

$$\Delta m = 0.038$$

$$\Delta c = \frac{(-0.1)(-4)}{\sqrt{51.78 + 10^{-8}}}$$

$$\Delta c = 0.4 / 7.195$$

$$\Delta c = 0.056$$

$$\text{Step 7: } m = 1.189 + 0.038$$

$$m = 1.227$$

$$c = -0.83 + 0.056$$

$$c = -0.774$$

$$\text{Step 8: } \text{sample} = 2$$

$$\text{Step 9: } 2 > 2 \quad \text{go to step 4}$$

$$\text{step 4: } g_m = - (3.8 - (1.227)(0.4) + 0.774)(0.4) \\ = - (4.574 - 0.49) 0.4$$

$$g_m = -1.633$$

$$g_c = -4.084$$

$$\text{step 5: } h_m = 4.23 + (-1.633)^2$$

$$h_m = 6.89$$

$$h_c = 51.78 + (-4.084)^2$$

$$h_c = 68.45$$

$$\text{step 6: } \Delta m = \frac{-0.1}{\sqrt{6.89 + 10^{-8}}} \times (-1.633)$$

$$\Delta m = 0.024$$

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

$$\Delta c = 0.049$$

$$\text{step 7: } m = 1.227 + 0.024$$

$$m = 1.251$$

$$c = -0.774 + 0.049$$

$$c = -0.725$$

Step 8: sample = 3

Step 9: $3 > 2$ goto next step

Step 10: $its = 3$

Step 11: if ($its > no. of its$)
 $3 > 2$ goto next

Step 12: print m & c values

$$m = 1.25$$

$$c = -0.725$$