Assignment-13

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ADAGRAD

	x	y
0	0.2	3.4
1	0.4	3.9
2	0.6	4.2
3	0.8	4.6

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

step-2: itr = 1

step-3: sample = 1

step-4:
$$g_m = -(y_i - mx_i - c)x_i$$
$$= -(3.4 - (1)(0.2) - (-1))(0.2)$$
$$= -0.84$$

$$g_c = -(y_i - mx_i - c)$$
$$= -(3.4 - (1)(0.2) - (-1))$$
$$= -4.2$$

Step-5:
$$G_m = G_m + (g_m)^2$$
$$= 0 + (-0.84)^2$$
$$= +0.705$$

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

step-6:
$$\Delta m = \frac{-\eta}{\sqrt{G_m + \varepsilon}} g_m$$
$$= \frac{-0.1}{\sqrt{.0705 + 10^{-8}}} (-0.84)$$
$$= 0.10$$

$$\Delta c = \frac{-\eta}{\sqrt{G_m + \varepsilon}} g_c$$
$$= \frac{-0.1}{\sqrt{17.64 \times 10^{-8}}} \times (-4.2)$$
$$= 0.09$$

Step-7:
$$m = m + \Delta m$$
$$= 1 + 0.1$$
$$m = 1.1$$

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

step-8: sample = sample + 1
= 1 + 1 = 2

step 9: if (sample > ns)
if (2 > 2)
false → step (4)

step 4: $g_m = -(3.8 - (1.1)(0.4) - (-0.91))(0.4)$
$= -1.703$

$g_c = -(3.8 - (1.1)(0.4) - (-0.91))$
$= -4.27$

step-5: $G_m = G_m + (g_m)^2$
$= +6.705 + (-1.709)^2$
$G_m = 3.62$

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

step-6: $\Delta m = \frac{-\eta}{\sqrt{G_m + \varepsilon}} g_m$

$\Delta m = \frac{-0.1}{\sqrt{3.62 + 10^{-8}}} (-1.708)$

$= 0.089$

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

$\Delta c = \frac{-0.1}{\sqrt{35.87 + 10^{-8}}} (-4.$

$= 0.0701$

step-7: $m = m + \Delta m$
$= 1.1 + 0.089$
$= 1.189$

$c = c + \Delta c$
$= -0.91 + 0.0701$
$= -0.83$

step-8: sample = 2 + 1 = 3

step-9: if (sample > ns)
3 > 2
goto step-

step-10: itr = itr + 1 = 1 + 1 = 2

step-11: if (itr > epochs)
2 > 2
false go to step (2)

step-3: sample = 1

step-4: $g_m = -(3.4 - (1.189)(0.2) + 0.83)0.1 = -0.80$

$g_c = -((3.4) - (1.189)(0.2) + 0.83) = -4.0$

step-5: $G_m = 3.69 + (-0.80)^2 = 4.28$

$G_c = 35.87 + (-4.0)^2 = 51.89$

step-6: $\Delta m = \frac{-0.1}{\sqrt{4.28 + 10^{-8}}} * -0.80 = 0.038$

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

step-7: $m = m + \Delta m = 0.038 + 1.18 = 1.218$

$c = c + \Delta c = -0.83 + 0.05 = -0.78$

step-8: sample = sample + 1

= 1 + 1 = 2

step-9: if (sample > ns)

2 > 2

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: $G_m = 4.23 + (-1.64)^2 = 69$

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

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: $m = m + \Delta m = 1.278 + 0.06 = 1.278$

$c = c + \Delta c = -0.78 + 0.04 = -0.74$

Step 8: sample = sample + 1

= 2 + 1 = 3

Step 9: if (sample > ns)

3 > 2

True goto step (10)

Step 10: itr = itr + 1

= 2 + 1 = 3

Step 11: if (itr > epochs)

3 > 2

True goto step (12)

Step 12: m = 1.278

c = -0.74