ASSIGNMENT-9

18K41A0536
CSE-A
M. Anitha.

* Momentum optimizer

Sample (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 calculation:

Step 1: initialization

$[x, y]$, $m=1$, $c=-1$, $\eta=0.9$, epochs $=100$

$v_m = v_c = 0$, $\eta = 0.1$

Step 2: iter $= 1$

step 3: sample $= 1$

Step 4: $E = \frac{1}{2}(y_i - m*x_i - c)^2$

$g_m = \frac{\partial E}{\partial m} = -(y_i - mx_i - c) * x_i$

$g_c = \frac{\partial E}{\partial c} = -(y_i - mx_i - c)$

$$g_m = -(3.4 - (1 \times 0.2) + 1) \times 0.8$$

$$g_m = -0.84$$

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

$$g_c = -4.2$$

step 5: $v_m = \beta v_m - \eta g_m$

$$= (0.9)(0) - (0.1)(-0.84)$$

$$\boxed{v_m = 0.084}$$

$$v_c = \beta v_c - \eta g_c$$

$$v_c = (0.9)(0) - (0.1)(-4.2)$$

$$\boxed{v_c = 0.42}$$

step 6: $m = m + v_m$

$$= 1 + 0.084$$

$$\boxed{m = 1.084}$$

$$c = c + v_c$$

$$= -1 + 0.42$$

$$\boxed{c = -0.58}$$

Step 7: sample = 1+1 = 2

2 > 4

goto step 4

$g_m = -(3.8 - (1.084)(0.4) + 0.58)(0.4)$

$= -(3.8 - (0.43) + 0.58)(0.4)$

$\boxed{g_m = -1.58}$

$g_c = -(3.8 - (1.084)(0.4) + 0.58)$

$\boxed{g_c = -3.95}$

Step 5: $V_m = (0.9)(0.084) - (0.1)(-1.58)$

$= 0.075 + 0.158$

$= 0.23$

$V_c = (0.9)(0.42) - (0.1)(-3.95)$

$= 0.378 + 0.395$

$= 0.773$

Step 6: $m = 1.084 + 0.23$

$= 1.314$

$c = -0.58 + 0.77$

$= 0.19$

step 7: $5 = 3 > 2$ True

go to next step

step 8: itr = 2

step 9: if (it > epochs)

next step

Go to step 3

step 3: Sample = 1

step 4: $g_m = -(3.4 - (1.314)(0.2) - 0.19)(0.2)$

$= -(2.94) \times 0.2$

$= -0.588$

$g_c = -(3.4 - (1.314)(0.2) - 0.1)$

$g_c = -2.94$

step 5: $V_m = (0.9)(0.23) - (0.1)(-0.588)$

$= 0.26$

$V_c = (0.9)(0.77) - (0.1)(-2.94)$

$= 0.98$

step 6: $m = 1.314 + 0.26$

$= 1.574$

$C = 0.98 + 0.19$

$C = 1.17$

step 7: $s = 2 > 2$ ~~false~~

go to step 4

Step 5: $V_m = (0.9)(0.26) - (0.1)(-0.8)$

$\boxed{V_m = 0.314}$

$V_c = (0.9)(0.98) - (0.1)(-2)$

$\boxed{V_c = 1.08}$

step 6: $m = 1.574 + 0.314$

$m = 1.88$

$c = 1.17 + 1.08$

$= 2.25$

step 7: $s = 3$

step 8: $3 > 2$ go to next step

step 9: $it = 3$

step 10: if (it > epochs) go to next step

step 11. Print m, c values