Assignment 9

* 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 calculations

Step 1 : (x, y), $m = 1$, $c = -1$, $\eta = 0.1$,

epochs = 100, $\gamma = 0.9$, $V_m = V_c = 0$, $n_s = 2$ ✓

Step 2 : iter = 1

Step 3 : sample = 1

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

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

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

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

$$= -(4.2)(0.2)$$

$$= -0.84$$

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

$$= -4.2$$

step5 : $V_m = r V_m - \eta g_m$

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

$$(-0.84)$$

$$= 0.084$$

$$V_c = r V_c - \eta g_c$$

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

$$= 0.42$$

step6 : $m = m + V_m$

$$= 1 + 0.084$$

$$= 1.084 \checkmark$$

$$c = c + V_c$$

$$= -1 + 0.42$$

$$= -0.58$$

Step7, $s = 2 > 2$

go to step 4.

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

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

$$= -1.58$$

$$g_c = -(3.8 - (1.084)(0.4) + 0.58) \frac{1.084}{0.4}$$

$$= -3.95$$

Step5,

$$v_m = (0.9)(0.084)$$
$$\quad - (0.1)(-1.58)$$

$$= 0.075 + 0.158$$

$$= 0.23$$

$$v_c = (0.9)(0.42)$$
$$\quad - (0.1)(-3.95)$$

$$= 0.378 + 0.395$$

$$= 0.773 -$$

Step6 :

$$m = 1.084 - 0.23$$

$$= 1.314$$

$$c = -0.58 + 0.77$$

$$= 0.19$$

Step7 : $\quad$ $s = 3 > 2$ $\checkmark$ True

$\qquad\qquad\qquad$ go to Next Step

Step8 :- $\quad$ $it = 2$

step9 : $\quad$ if (it > epochs)

$\qquad\qquad\qquad$ next Step.

$$\therefore \quad m = 1.314$$

$$\downarrow$$

$$c = 0.19$$

for first two samples