Assignment - IX

- 18K41A0562

* simple linear regression model using Momentum optimizer.

sample (i)	x_i^a	y_i^a
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

↳ Do manual calculations for two iterations with first two samples.

Calculations:

step 1: [x, y], $m = 1$, $c = -1$, $\eta = 0.1$,
epoches = 2, $\delta = 0.9$, $v_m = v_c = 0$, $ns = 2$

step 2: iter = 1

step 3: sample = 1

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

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

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

$$= -0.84$$

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

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

$$= -4.2$$

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

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

$= 0 + 0.084$

$= 0.084$

$v_c = \gamma v_c - \eta g_c$

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

$= 0.42$

step 6: $m = m + v_m = 1 + (0.084) = 1.084$

$c = c + v_c = -1 + 0.42 = -0.58$

step 7: sample t = 1

step 8: if (sample > ns) // 2>2

goto step 9

else

goto step 4

step 4: $g_m = \frac{\partial E}{\partial m} = -(3.8 - (1.084)(0.4) + 0.58)(0.4)$

$= -1.5785$

$g_c = \frac{\partial E}{\partial c} = -3.9464$

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

$= (0.9)(0.084) - (0.1)(-1.5785)$

$= 0.0756 + 0.1578 = 0.2334$

$v_c = \delta v_c - \eta g_c$

$= (0.9)(0.42) - (0.1)(-3.9464)$

$= 0.378 + 0.3946$

$= 0.7726$

step 6: $m = m + v_m = (1.084) + (0.2334) = 1.3174$

$c = c + v_c = (-0.58) + (0.7726) = 0.1926$

step 7: sample += 1

step 8: if (sample > ns) // 3 > 2

goto step 9

else

goto step 4

step 9: iter += 1

step 10: if (iter > epoches) // 3 > 2

goto step 11

else

goto step 3

step 11: print (m, c)

$m = 1.3174$

$c = 0.1926$