18K41A04D2

Momentum Optimization (Assignment 9)

x	y
0.2	3.4
0.4	3.6

Step 1: $m = 1, c = -1, \eta = 0.1$, epochs = 2, $\gamma = 0.9$, $v_m = v_c = 0$

Step 2: iter = 0

Step 3: sample = 1

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

$$g_m = \frac{\partial \epsilon}{\partial m} = -(y_i - mx_1 - c)x_1 = -0.84$$

$$g_c = \frac{\partial \epsilon}{\partial c} = -(y_1 - mx_1 - c) = -4.2$$

Step 5: $v_m = \gamma v_m - \eta g_m = 0.084$

$v_c = \gamma v_c - \eta g_c = 0.42$

Step 6: $m = m + v_m = 0.84 + 1 = 1.084$

$c = c + v_c = -4.2 - 1 = -0.58$

Step 7: sample = sample + 1 = 2

Step 8: if(sample $\neq n_s$)

2 $\neq$ 2

goto step 4

Step 4: $g_m = \frac{\partial \epsilon}{\partial m} = -(y_2 - mx_2 - c)x_2 = -1.57856$

$g_c = \frac{\partial E}{\partial c} = -(y_2 - mx_2 - c) = -3.9464$

Step 5: $v_m = \gamma v_m - \eta g_m = 0$

$v_c = \gamma v_c - \eta g_c = 0$

Step 6: $m = m + v_m = 0.233456$

$c = c + v_c = 0.77264$

Step 7: sample = sample + 1 = 3

Step 8: if (sample $\geq n_s$)

$3 \geq 2$

goto step 9

Step 9: iter = iter + 1

$= 0 + 1 = 1$

Step 10: if (iter $\geq$ epochs)

$1 \not\geq 2$

goto step 3

Step 3: sample = 1

Step 4: $g_m = \frac{\partial E}{\partial m} = -(y_1 - mx_1 - c)x_1 =$ ~~-0.58877~~ -0.58877

$g_c = \frac{\partial E}{\partial c} = -(y_1 - mx_1 - c) =$ ~~-3.9464~~ -2.9434

Step 5: $v_m = \gamma v_m - \eta g_m = 0.26898$

$v_c = \gamma v_c - \eta g_c = 0.989762$

Step 6: $m = m + v_m =$ ~~1.58644~~ 1.58644

$c = c + v_c = 0.1.14240$

Step 7: sample = sample + 1 = 2

Step 8: if(sample > n_s)

2 ≯ 2

goto step 4.

Step 4: $g_m = \frac{d\epsilon}{dm} = -(y_2 - mx_2 - c)x_2 = -0.7932$

$g_c = \frac{\partial \epsilon}{\partial c} = -(y_2 - mx_2 - c) = -1.9830$

Step 5: $v_m = \gamma v_m - \eta g_m = 0.3214$

$v_c = \gamma v_c = \eta g_c = 0.0890$

Step 6: $m = m + v_m = 1.907853$

$c = c + v_c = 2.27149$

Step 7: sample = sample + 1 = 3

Step 8: if(sample > n_s)

3 > 2

goto next step

Step 9: iter = iter + 1

= 1 + 1 = 2

Step 10: if (iter ≥ epochs)

2 ≥ 2

goto next step

Step 11: m, c = 1.907853, 2.27149

MSE = 0.571851