

Assignment - 9

18K41A0242

Momentum optimizer

| x | y |
|-----|-----|
| 0.2 | 3.4 |
| 0.4 | 3.8 |

Step 1: $[x, y]$, $m = 1$, $c = -1$, $n = 0.1$, epochs = 2,
 $\eta = 0.9$
 $V_m = V_c = 0$

Step 2: $itr = 1$

Step 3: Sample = 1

$$\text{Step 4: } g_m = \frac{\partial E}{\partial m} = -(y_i - mx_i - c)x_i$$

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

$$\frac{\partial E}{\partial m} = -0.84$$

$$g_c = \frac{\partial E}{\partial c} = -[3.4 - 1(0.2) + 1]$$

$$\frac{\partial E}{\partial c} = -4.2$$

Step 5: $V_m = \eta V_m - \eta g_m$

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

$$V_m = 0.084$$

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

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

$$V_c = 0.042$$

$$\text{Step 6: } m = m + V_m = 1 + 0.084 = 1.084$$

$$C = C + V_c = -1 + 0.042 = -0.58$$

$$\text{Step 7: Sample} = 1 + 1 = 2$$

$$\text{Step 8: } \text{if (Sample} > n_s) \\ 2 > 2$$

$$\text{Step 4: } g_m = \frac{\partial E}{\partial m} = -[3.8 - (1.084)(0.4) + 0.58](0.1)$$

$$g_m = -1.57856$$

$$g_c = \frac{\partial E}{\partial C} = -[3.8 - (1.084)(0.4) + 0.58]$$

$$g_c = -3.9464$$

$$\text{Step 5: } V_m = \eta V_m - \eta g_m$$

$$= (0.9)(0.084) - (0.1)(-1.57856)$$

$$V_m = 0.233456$$

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

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

$$V_c = 0.77264$$

step 6:

$$m = m + V_m = 1.084 + 0.233456$$

$$m = 1.3174$$

$$C = C + V_c = -0.58 + 0.77264$$

$$C = 0.19264$$

Step 7: Sample = 2+1=3

Step 8: if (3>2)

Step 9: itr = itr + 1 = 1+1=2

Step 10: if (2>2)

Step 3: Sample = 1

Step 4: $g_m = \frac{\partial E}{\partial m} = -[3.4 - (1.3174)(0.2) - 0.19264]$
(0.2)

$g_m = -0.5887$

$g_c = \frac{\partial E}{\partial c} = -[3.4 - (1.3174)(0.2) - 0.19264]$

$g_c = -2.9438$

Step 5: $V_m = \eta V_m - \eta g_m$

$= (0.9)(0.23345) - (0.1)(-0.5887)$

$V_m = 0.26897$

$V_c = \eta V_c - \eta g_c$

$= (0.9)(0.77264) - (0.1)(-2.9438)$

$V_c = 0.9897$

Step 6: $m = m + V_m = 1.3174 + 0.26897$

$m = 1.5863$

$c = c + V_c = 0.19264 + 0.9897$

$c = 1.18234$

Step 7: Sample = 1+1=2

Step 8: if (Sample > ns) $2 > 2$

Step 4: $g_m = \frac{\partial E}{\partial m} = -[3.8 - (1.586)(0.4) + 1.1823]$

$$g_m = -1.7391$$

$$g_c = -4.3479$$

Step 5: $V_m = \gamma V_m - n g_m$

$$= (0.9)(0.26897) - (0.1)(-1.7391)$$

$$V_m = 0.41604$$

$$V_c = \gamma V_c - n g_c$$

$$= (0.9)(0.9897) - (0.1)(-4.3479)$$

$$V_c = 1.3255$$

Step 6: $m = m + V_m = 1.5863 + 0.41604$

$$m = 2.0023$$

$$c = c + V_c = 1.18234 + 1.3255$$

$$c = 2.507$$

Step 7: Sample = 2+1=3

Step 8: if (3 > 2)

Step 9: itr = 2+1=3

Step 10: if (3 > 2)

Step 11: $m = 2.00, c = 2.507$