Assignment-11

Yesterio Accelerated gradient descent

Step 1: (x, y), $m = 9$ $c = -4$ $\eta = 0.9$ $\gamma = 0.9$ $vm = 0$,

$vc = 0$, epochs $= 2$, $ns = 2$

x	y
0.2	3.4
0.4	3.8

Step 2: iteration $= 1$

Step 3: sample $= 1$

Step 4: $gms = (y_i - (m + \gamma(m)) x_i - (c + \gamma vc)) x_i$

$= (3.4 - (1 + (0.9)0) 0.2) - ((-1) + 0)) \times 0.2$

$= (3.4 - 0.2 + 1) 0.2 = -(4.2 \times 0.2)$

$= -0.84$

$gc = -4.2$

Step 5: $vm = \gamma vm - \eta gms) (0.9)(0) - (0.1)(0.84)$

$= 0.084$

$vc = \gamma vc - \eta gc = (0) - (0.1)(-4.2)$

$= 0.42$

Step 6: $m = m + vm = 1 + 0.084 = 1.084$

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

step 8: if sample > no. of samples ⇒ 2 > 2 false

Goto step 4

step 9:

$$gm = -(3.8 - (1.084 + (6.9) \times (0.084)) \times 0.4$$

$$- (-0.58 + (6.9)(0.42)) \wedge 0.4)$$

$$= -(3.8 - (1.596 \times 0.4 + 0.958) 0.4$$

$$- (4.29416) \times 0.4$$

$$= -1.717664$$

$$gc = -4.29416$$

$$Vm = rVm - \eta gm ⇒ (0.9)(0.084) - (0.1)(-1.717664)$$

$$⇒ 0.2473664$$

$$Vc = rVc - \eta gc ⇒ (0.9)(0.42) - (0.1)(-4.29416)$$

$$⇒ -0.807416$$

$$m = m + Vm ⇒ 1.084 + 0.24736 = 1.33136$$

$$c = c + Vc ⇒ -0.58 + \quad 0.807416 = 0.227416$$

$$\quad 0.807416 = 0.227416$$

Sample 2+1

= 3

if sample 7 > 0.06 samples

3 7 2 € True

go to next step

iteration = 1+1=> 2

If iteration > epochs

2 7 2 false

go to step 3

Sample >1

$$gm = -\left(si - (m + rvm) \, ni - (c + rvc)\right) ni$$

$$= \left(3.4 - \left(1.33136 + \left[(0.9) \times (0.24736) \right] \times 0.2 - \right.\right.$$

$$\left[0.287416 + (0.9) \times (0.807416) \right]$$

$$= - \left(3.4 - \left[1.553984 \right] \times 0.2 - \left[0.954091 \right] \right)$$

$$= - (2.13511)$$

$$gc = - \left(3.4 - 1.553984 - 0.954091 \right)$$

$$= - 0.891926$$

$vm = \gamma vm - \eta gm$

$\rightarrow (0.9) \times 0.2473644 - (0.1) \times (-2.73511)$

$= 0.4364414$

$vc = \gamma vc - \eta gc = (0.9 \times 0.867416) - (0.1)(-0.891926)$

$= 0.815867$

step 9: $m = m + vm \rightarrow 1.3316 + 0.43614 \Rightarrow 1.76774$

$c = c + vc \Rightarrow 0.227416 + 0.8158672 \quad 1.043283$

Sample $=$ Sample $+1 \Rightarrow$) $1 + 1 \Rightarrow 2$

if sample $> ns \Rightarrow 2 > 2$, false

repeat step 9

$gm = -\left(yi - (m + \gamma vm) ni - (c + \gamma vc)\right) ni$

$-\left[3.8 - \left(1.76774 + (0.9) \times 0.436147\right) \times 0.9 - \right.$

$\left. (1.043283) + (0.9 \times 0.815867)\right] \times 0.9$

$-\left[3.8 - (2.160266) \times 0.9 - 1.7775633 \right] \times 0.9$

$= -0.4463332$

$$\theta_z = -(3.8 - (2.160266 \times 0.4) - 1.7775633)$$

$$= 1.1583303$$

$$v_m = \delta v_m - \eta \frac{d\varepsilon}{\delta m}$$

$$(0.9)(0.436141) - (0.1)(-0.463332)$$

$$= 0.4388592$$

$$v_c = r v_c - \eta \frac{d\varepsilon}{\delta c}$$

$$0.9 \times 0.818867 - (0.1)(-1.1583303)$$

$$= 0.8501133$$

Step 1 $m = 1.76774 + 0.4388592$

$$= 2.2065592$$

$$c = 1.043153 + 1.1583303$$

$$= 2.2016137$$

'Sample > 2 + 1 = 3 7 2

sample 7 cycles

so to next step

Iterations 2 + 1 = 3

                  37 2 (cycle)

                 step next step

print (m, c)

2.2065992;

2.2016133

calculate MSE

$$= \frac{(3.4-(2.2065992 \times 0.2) - 2.2016133)^2 +}{(3.8 - (2.2065992 \times 0.4 - 2.2061331(2))^2}{2}$$

$$= \frac{0.57135 + (0.512293}{2}$$

$$> 0.54271$$