# ASSIGNMENT - 11

18K41A0538.

let us consider a sample dataset have one input ($x_i$) and output ($y_i$) and number of samples 4. Develop a SLR model using nestrow accelerated gradient (NGA) optimiser.

| 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 2 iterations with 1st & samples.

step 1: [x, y] m=1, c=-1, $\eta$=0.1, epochs = 2, $\gamma$=0.9,

$v_m = v_c = 0$, ns = 2

step 2: itr = 1

step 3: simple = 1

step 4: $g_m = \frac{\partial E}{\partial m} = -(y_i - (m_1 + \gamma v_m)x_i - (c + \gamma v_c)x_i$

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

$0.2$

$= -0.84$

$g_c = \frac{\partial E}{\partial c} = -(y_1 - (m + \gamma v_m)x_i - (c + \gamma v_c)$

$= -(3.4 - (1 + 0.9)x0)0.2$

$= -(-1 + (0.9)0)$

$= -4.2$

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

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

$= -0.084$

$$Vc = \theta Vc - \eta gc$$
$$= (0.9)(0) - (-0.1)(-4.2)$$
$$= -0.42$$

step-6: $m+ = Vm$
$$1 - 0.084 = 0.916$$
$$c+ = Vc = -1 - 0.42$$
$$= -1.42$$

step-7: sample+ = 1
$$1+1 = 2$$

step-8: if (sample > ns)
goto step-9
else goto step-4

step-4: $gm = \frac{\partial E}{\partial m} = -(3.8 - (0.916 + (0.9x - 0.089))$
$0.4 - (-1.42 + (0.98 - 0.034) \times 0.4)$
$= -1.983$

$$gc = \frac{\partial E}{\partial c} = -4.959$$

step-5: $Vm = \theta Vm - \eta gm$
$= (0.9x - 0.084) - (-0.1x - 1.983)$
$= -0.2739$
$Vc = (0.9x - 0.42) - (-0.1 \times -4.959)$
$= 0.8739$

step-6: $m+ = Vm$
$= 0.916 - 0.2739$
$= 0.6421$
$c+Vc$
$= -1.42 - 0.8739$
$= -2.2939$

step-7: sample+ = 1
$1+1 = 3$

step-8: if (sample > ns)
goto step-11

else

Goto step-3

Step-3: Sample = 1

Step-4: $\frac{\partial E}{\partial m} = -(3.4 - (0.642 + (0.9 \times 0.273)) \times 0.2 - (-2.293 + (0.9 \times -0.273) \times 0.2)$

$g_m = -1.171$

$g_c = \frac{\partial E}{\partial c} = -5.859$

Step-5: $v_m = \theta v_m - \eta g_m$

$= [(0.9) \times (-0.273)] - (-0.1 \times -1.81)$

$= -0.3627$

$v_c = v_c \theta - \eta g_c$

$= (0.9)(-0.873) - (-0.1)(-5.859)$

$= -1.3707$

Step-6: $m_t = v_m$

$= 0.6421 + (-0.3627)$

$= 0.2794$

$c_t = v_c$

$= -2.2939 - 1.3707$

$= -3.6646$

Step-7: sample $t = 1$

$t+1 = 2$

Step-8: if (sample > ns)

Goto step-9

else Goto step-4

Step-4: $g_m = \frac{\partial E}{\partial m} = -(3.8 - (0.2794 + (0.9 \times -0.3627)) \times 0.4 - (-3.6646 + (0.9)$

$= -2.985$

$g_c = \frac{\partial E}{\partial c} = -7.4645$

Step-5: $v_m = [0.9 \times -0.3627] - [-0.1 \times -2.985]$

$= -0.6249$

$V_c = [0.9 \times -1.3707] - [-0.1 \times 7.4645]$

$= -1.9800$

Step-6: $m_t = V_m$

$= 0.2974 + (-0.6249)$

$= -0.3275$

$c_t = V_c = -3.6646 - 1.9800$

$= -4.6446$

Step-7: sample += 1

2+1 = 3

Step-8: if (sample > ns)

goto step-9

else goto step-4

Step-9: itr += 1

2+1=3

Step-10: if (itr > epochs)

goto step-4

else goto step-3

Step-11: print m, c

m = 0.3275

c = -4.6446