Assignment - 11

- 18K41A0491

Let us consider a sample dataset have one input (x_i) and one output (y_i) and number of samples 4. Develop a SLR model using nestrov accelerated gradient (NAG) optimiser.

Sample (i)	x_i	y_i
1	0.2	3.4
2	0.4	3.8
3	0.6	3.2
4	0.8	4.6

Step 1 : [x, y], m=1, c=-1, η=0.1, epochs = 2, γ = 0.9, $v_m = v_c = 0$, ns = 2

Step 2 : itr = 1

Step 3 : sample = 1

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

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

$= -0.84$

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

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

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

$= -4.2$

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

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

$= -0.084$

$V_c = \gamma V_c - \eta g_c$

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

$= -0.42$

step-6 : $m_t = V_m$

$1 - 0.084 = 0.916$

$c_t = V_c = -1 - 0.42$

$= -1.42$

step-7 : sample t = 1

t+1 = 2

step8 : if (sample > ns)

goto step-9

else

goto step-4

step-4 : $g_m = \frac{\partial E}{\partial m} = -(3.8 - (0.916 + (0.9 \times -0.089)))$

$= 0.4 - (-1.42 + (0.98 - 0.034) \times 0.4)$

$= -1.983$

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

step5 : $V_m = -\gamma V_m - \eta g_m$

$= (0.9 \times -0.084) - (-0.1 \times -1.983)$

$= -0.2739$

$V_c = (0.9 \times -0.0.42) - (-0.1 \times -4.959)$

$= 0.8739$

step6 :- $m_t = V_m$

$= 0.916 - 0.2739$

$= 0.6421$

$c_t = V_c$

$= -1.42 - 0.8739 = -2.2939$

step-7 :- sample t = 1

t+1 = 3

step-8: if (sample > ns)
goto step-11
2 > 2
else
goto step-3

step 3: sample = 1

step 4 $\frac{\partial E}{\partial m} = -(3.4 - (0.642 + (0.9 \times 0.273))) \times 0.2$
$-(-2.93 + (0.9 \times -0.273) \times 0.2)$

$gm = -1.171$

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

step 5: $vm = \delta v_m - \eta g_m$
$= [(0.9) \times (-0.273)] - (-0.1 \times -1.81)$
$= -0.3627$

$v_c = \delta v - \eta g_c$
$= (0.9)(-0.873) - (-0.1)(-5.859)$
$= -1.3707$

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 += 1
1 + 1 = 2

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

step 4: $gm = \frac{\partial E}{\partial m} = -(3.8 - (0.279 + (0.9 \times -0.3627)))$
$\times 0.4 - (-3.6646 + (0.9)$

$= -2.985$

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

step 5: $Vm = [0.1 \times -0.3627] - [-0.1 \times -2.985]$

$= -0.6249$

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

$= -1.9800$

step 6: $m_t = Vm$

$= 0.2974 + (-0.6249)$

$= -0.3275$

$c_t = Vc = -3.6646 - 1.9800$

$= -4.6446$

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

$m = 0.3275$

$c = -4.6446$.