ASSIGNMENT-11

– 18K41A0530

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^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 2 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: Sample = 1

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

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

$= -0.84$

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

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

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

$= -4.2$

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

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

$= -0.084$

$V_c = \partial V_c - \eta g_c$

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

$= -0.42$

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

1+1=2

step-8: if (sample > ns)

goto step-9

else goto step-4

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

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

$= -1.983$

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

step-5: $V_m = \partial V_m - \eta g_m$

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

$= -0.2739$

$V_c = (0.9 \times -0.42) - (-0.1 \times -4.959)$

$= 0.8739$

step-6: $m_t = V_m$

$= 0.916 - 0.2739$

$= 0.6421$

$c_t = V_c$

$= -1.42 - 0.8739$

$= -2.2939$

step-7: sample t = 1

1+1=3

step-8: if (sample > ns)

goto step-11

2 > 2

else

goto step-3

Step-3: Sample = 1

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

$g_m = -1.171$

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

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

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

$= -0.3627$

$v_c = v_c^9 - \eta g_c$

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

$= -1.3707$

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

~~7~~ t+1 = ~~2~~

Step-8: if (sample > ns)

goto step-9

else goto step-4

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

$= -2.985$

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

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

$= -0.6249$

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

$= -1.9800$

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 t = 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