ASSIGNMENT-II

– 18K41A0502

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) optimizer

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

S-1 : [X, Y], m = 1, c = -1, η = 0.1, epochs = 2, γ = 0.9, $v_m = v_c = 0$, ns = 2

S-2 : itr = 1

S-3 : sample = 1

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

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

$= -0.84$

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

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

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

$= -4.2$

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

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

$= -0.084$

$v_c = \delta v_c - \eta g_c$

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

$= -0.42$

S-6: $m_t = v_m$

$t - 0.084 = 0.916$

$c_t = v_c = -t - 0.42$

$= -1.42$

S-7: sample $t = 1$

$1 + 1 = 2$

S-8: If (sample > ns)

goto s-9

else

goto s-4

S-4: $g_m = \frac{\partial E}{\partial m} = -(3.8 - (0.916 + (0.9 \times -0.089)) \cdot 0.4 - (-1.42 + (0.98 - 0.034) \times 0.4)$

$= -1.983$

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

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

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

$= -0.2739$

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

$= 0.8739$

S-6: $m_t = v_m$

$= 0.916 - 0.2739$

$= 0.6421$

$c_t = v_c = -1.42 - 0.8739$

$= -2.2939$

S-7: sample t = 1

1+1 = 3

S-8: if (sample > ns)

goto S-11

else

goto S+3

S-3: sample = 1

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

$gm = -1.171$

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

S-5: $Vm = \partial Vm - \eta gm$

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

$= -0.3627$

$Vc = Vc\partial - \eta gc$

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

$= -1.3707$

S-6: $mt = Vm$

$= 0.6421 + (-0.3627)$

$= 0.2794$

$ct = Vc$

$= -2.2939 - 1.3707$

$= -3.6646$

S-7: sample t = 1

1+1 = 2

S-8: If (sample > ns)

goto s-9

else

goto s-4

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

$= -2.985$

$g_c = \frac{\partial E}{\partial c} = -7.4695$

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

$= -0.6249$

$v_c = [0.9 \times -1.3707] - [-0.1 \times 7.4695]$

$= -1.9800.$

S-6: $m_t = v_m$

$= 0.2974 + (-0.6249)$

$= -0.3275$

$c_t = v_c = -3.6646 - 1.9800$

$= -4.6446.$

S-7: sample t = 1

2 + 1 = 3

S-8: If (sample > ns)

goto s-9

else

goto s-4

S-9: itr += 1

epl = 3

S-10: if (itr > epochs)

goto S-4

else

goto S-3

S-11: print m, c

m = 0.3275

c = -4.6446.