ASSIGNMENT-II

18K41A0586

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.

step1 : [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 : $g_m = \frac{\partial E}{\partial m} = (-y_i - (m + \gamma v_m) x_i - (c + \gamma v_c)) x_i$

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

$= -0.84$

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

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

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

$= -4.2$

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

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

$= -0.084$

$v_c = \gamma v_c - \eta g_c$

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

$= -0.42$

Step6: $m+=v_m$

$1 - 0.084 = 0.916$

$c+=v_c = -1-0.42$

$= -1.42$

Step 7: sample+=1

$1+1 = 2$

Step 8: if(sample>ns)

goto step-9

else

goto step-4

Step 4: $g_m = \frac{\partial E}{\partial m} = -(3.8 - (0.916 * (0.9 \times -0.084)) * 0.4 - (-1.42 * 0.98 - 0.034) \times 0.4)$

$= -1.983$

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

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

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

$= 0.2739$

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

$= 0.8739$

Step 6: $m+=v_m$

$= 0.916 - 0.2739$

$= 0.6421$

$c+=v_c$

$= -1.42 - 0.8739$

$= -2.2939$

else

go to step-3

Step 3 : sample = 1

Step-4 : $\frac{\partial E}{\partial m} = -(3.4-(0.6427+(0.9\times 0.273))\times 0.2+2.293+(0.9\times -0.273)\times 0.2)$

$g_m = -1.171$

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

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

$= (0.9)(-0.873)] - [-0.1\times -1.81]$

$= -0.8627$

$v_c = \gamma_c v - \eta g_c$

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

$= -1.3707$

Step-6 : $m += v_m$

$= 0.6421 + (-0.3627)$

$= 0.2794$

$c += v_c$

$= -2.2939 - 1.3707$

$= -3.6646$

Step 7 : sample += 1

$1+1 = 2$

Step 8 : if (sample > ns)

go to step-9

else

go to step-6

Step 9 : $g_m = \frac{\partial E}{\partial m} = -(3.8-0.279+(0.9\times -0.3627))$

$\times 0.9 - (-3.6646 + (0.9)$

$= -2.985$

$g_c = \frac{\partial E}{\partial c} = -7.9645$

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

$= -0.6299$

$v_c = [0.9 \times 1.5707) - [-0.1 \times 7.4695]$

$= -1.9800$

Step-6: $m_t = v_m$

$= 0.2974 + (-0.6299)$

$= -0.3275$

$c_t = v_c = -3.6646 - 1.9800$

$= -4.6446$

Step 7: sample + = 1

2 + 1 = 3

Step 8: if (sample <= ns)

go to step-9

else

go to step-4

Step -9: itr + = 1

2 + 1 = 3

Step-10: if (itr >= epochs)

go to step-4

else

go to step-3

Step-11: print m, c

$m = 0.3275$

$c = -4.6446$