Assignment - II

18K41A0587

8) Develop a simple linear regression model using 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

Sol: step1 : [X,Y] , m=1, c=-1, η=0.1, epochs=2, γ=0.9, $V_m = V_c = 0$, hs=2.

step2 : itr=1

step3 : sample=1

step4 : $g_m = \frac{\partial \epsilon}{\partial m} = -\{y_i - (m+\gamma V_m)x_i - (c+\gamma V_c)\}x_i$

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

$= -0.84$

$g_c = \frac{\partial \epsilon}{\partial c} = -(3.4 - (1+0.9\times 0)0.2 - (-1 + (0.9)0)$

$= -4.2$

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

$= (0.9)(0) - (-0.1) \times (-0.84) = -0.084$

$V_c = \gamma V_c - \eta g_c$

$= (0.9)(0) - (-0.1)(-4.2) = -0.42.$

step 6 : $m = m + V_m = 1 - 0.084 = 0.916$

$c = c + V_c = -1 - 0.42 = -1.42$

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

step 8 : if (sample > ns)

goto step 9

else

goto step 4

step 4 : $g_m = \frac{\partial \epsilon}{\partial m} = -(3.8 - (0.916 + (0.9 \times 0.084)) 0.4 -$

$(-1.42 + (0.9 \times 0.084))\ 0.4.$

$= -1.983$

$g_c = \frac{\partial \epsilon}{\partial c} = -4.954$

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 : $m = m + V_m = 0.916 - 0.2739 = 0.6421$

$c = c + V_c = -1.42 - 0.8739 = -2.2939$

step 7 : sample = sample + 1 = 2 + 1 = 3

step 8 : if (sample > ns)

go to step 9

else

goto step 4

step 9 : itr = itr + 1 = 1 + 1 = 2

step 10 : if (itr > epochs) goto step 11

2 > 2

else : goto step 3

step 3 : sample = 1

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

$(-2.83 + (0.9 \times -0.273)\ 0.2$

$= -1.171$

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

step 5 : $V_m = \gamma V_m - \eta g_m = (0.9)(-0.273) - (-0.1 \times -1.81) = -0.3627$

$V_c = \gamma V_c - \eta V_c = (0.9)(-0.873) - (0.1)(-5.859) = -1.3707$

step 6 : $m = m + V_m = 0.6421 + (-0.3627) = 0.2794$

$c = c + V_c = -2.2939 - 1.3707 = -3.6646$

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

step 8 : if (sample > ns) : goto step 9

else : goto step 4.

step 4 : $g_m = \frac{\partial \epsilon}{\partial m} = -2.985$

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

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 : $m = m + V_m = 0.2974 + (-0.6249) = -0.3275$

$c = c + V_c = -3.6646 - 1.9800 = -4.6446$

step 7 : sample = sample + 1 = 2 + 1 = 3

step 8 : if (sample > ns) : goto step 9

else : goto step 4.

step 9 : itr = itr + 1 = 2 + 1 = 3.

step 10 : if (itr > epochs) : goto step 11

else : goto step 3.

step 11 : print m, c

$m = 0.3275$ $c = -4.6446$.