Assignment-9

Let us consider a sample dataset having i/p (x_i) and o/p (y_i) and no. of samples. Develop a simple linear regression model using momentum 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

step 1: [x, y] $m=1, c=-1, \eta=0.1$, epochs = 2, $\gamma=0.9$,

$v_m = v_c = 0, n = 2$

step 2: iter = 1

step 3: sample = 1

step 4: $g_m = \frac{d\epsilon}{dm} = -(y_i - mx_i - c)x_i$

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

$= -0.84$

$g_c = \frac{d\epsilon}{dc} = -(y_i - mx_i + c)$

$= -(3.4 - 0.2 + 1)$

$= -4.2$

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

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

$= 0 - 0.084 = -0.084$

$v_c = \gamma v_c - \eta g_c$

$= 0.9 \times 0 - (-0.1)(-4.2) = -0.42$

step 6: $m + v_m = 1 + (-0.84) = -0.916$

$c = c + v_c = -1 - 0.142 = -1.42$

step 7: Sample + = 1

$\Rightarrow 1 + 1 = 2$

step 8: if (sample > ns): go to step 9

$2 > 2$

else: go to step 4

step 4: $g_m = \frac{dE}{dm} = -(3.8 - 10.916)(0.4) + 1.42)$
(0.4)

$= -1.941$

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

$= (0.9)(-0.084) - [-0.1 \times -1.941]$

$= -0.2697$

$v_c = \gamma v_c - \eta g_c$

$= (0.9)(-0.42) - [-0.1 \times -4.853]$

$= -0.863$

step 6: $m = m + v_m = 0.916 + (-0.2697) = 0.6463$

$c = c + v_c = -1.42 - 0.863 = -2.283$

step 7: sample = sample + 1

$= 2 + 1 \Rightarrow 3$

step 8: if (sample > ns): go to step 9

else: go to step 4

step 9 : iter += 1

=> 1+1 = 2

step 10 : if (itr > epochs) go to step 4

else : go to step 3

step 9 : iter += 1

=> 2+1 = 3

step 10 : if (iter > epochs) : go to step 11

3 > 2

else : go to step 3

step 12 : print m, c

m = -0.316 , c = -5.543