ASSIGNMENT-11 18K41A04B2

Let us consider a sample dataset having one Input (x_i^a) and one output (y_i^a) and number of samples 4. Develop a SLR model using nestrov Accelerated gradient optimisers.

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, η = 0.1, epochs = 2

γ = 0.9, vm = vc = 0, ns = 2

Step 2:- iter = 1

Step 3:- Sample = 1

Step 4:- $gm = \frac{\partial \epsilon}{\partial m} = -(y_i - m + \gamma m)x_i - (c + \gamma vc)x_i$

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

$= -0.34$

$gc = \frac{\partial \epsilon}{\partial c} = -(y_i - m + \gamma vm)x_i - (c + \gamma c))$

$= -(3.4 - (1+0.9x0)0.2 - (-1+(0.9)0)$

$= -4.2$

Step 5:- $vm = \gamma vm - \eta gm$

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

$= -0.084$

$$v_c = \gamma v_c - \eta g_c$$

$$= (0.9)(0) - (-0.1)(-1.42)$$

$$= -0.142$$

Step6:- $m = m + v_m$

$$= 1 - 0.084 = 0.916$$

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

$$= -1.142$$

Step7:- sample = sample + 1 = 1 + 1 = 2

Step8:- if (sample > ns): goto step 9

else: goto step 4.

Step4:- $g_m = \frac{\partial \epsilon}{\partial m} = -(3.8 - (0.916 + (0.9 \times -0.089))0.4$

$$- (-1.142 + (0.9 - 0.089)0.4)$$

$$= -1.983$$

$$g_c = \frac{\partial \epsilon}{\partial c} = -4.859$$

Step5:- $v_m = \gamma v_m - \eta g_m$

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

$$= -0.2739$$

$$v_c = (0.9 \times 0.142) - (-0.1 \times 4.959)$$

$$= -0.8374.$$

Step6:- $m = m + v_m = 0.916 - 0.2734$

$$= 0.6421$$

$$c = c + v_c = -1.142 - 0.8739$$

$$= -2.2939$$

Step7:- sample = sample + 1

$$2 + 1 = 3$$

Step 8 :- If (sample > ns) : goto step 9

else : goto step 4

Step 9 :- Iter = iter + 1 => 1 + 1 = 2

Step 10 :- if (Itr > epochs) goto step 11

else : goto step 3.

Step 3 :- sample = 1

Step 4 :- $\frac{\partial e}{\partial m} \Rightarrow gm =$

$= -(3.4 - (0.642 + (0.9 \times 0.273)) \times 0.2 - (-2.293 + (0.9 \times -0.273) \times 0.2$

$gm = -1.171$

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

Step 5 :- $vm = \gamma vm - \eta gm$

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

$= -0.3627$

$vc = \gamma vc - \eta gc$

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

$= -1.3707$

Step 6 :- $m = m + vm = 0.6421 + (-0.3627)$

$= 0.2784$

$c = c + vc = -2.2939 - 1.3707$

$= -3.6646.$

Step7 :- Sample = Sample + 1 => 1+1 = 2

Step8 :- if (sample > ns) : goto step 9

else : goto step 4

Step4 :- $gm = \frac{\partial e}{\partial m}$

$= -(3.8 - (0.278) + (0.9 \times -0.3627) \times 0.4 - (-3.6646 + 0.9 -)$

$= -2.985$

$gc = \frac{\partial e}{\partial c} = -7.4645$

Step5 :- $Vm = [0.9 \times -0.3627] - [-0.1 \times -2.985]$

$= -0.6248$

Step 6 : $m = m + Vm = 0.2974 + (-0.6249)$

$= -0.3275$

$c = c + Vc = -3.6646 - 1.9800$

$= -4.6446$

Step 7 :- sample = sample + 1 => 2+1 = 3

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

else : goto step 3

Step11 : print m, c

m = 0.3275

c = -4.6446