Assignment - 9

18KU1A0423

Let us Consider a sample data set have i/p (x_i) and o/p (y_i) and number of samples 4. Develop a simple linear regression model using momentum optimizer.

Sample (i)	x_i	y_i
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

Do manual Calculation for 8 iteration with first 2 samples.

Step1 : [x,y], m=1, c=-1, η=0.1, epoches = 2, γ=0.9, $v_m = v_c = 0$

$n_s = 2$

Step2: iter=1

Step3: sample=1

Step4: $g_m = \frac{\partial E}{\partial m} = -(y_i - mx_i - c)x_i$

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

$= -0.84$

$g_c = \frac{\partial E}{\partial c} = -(y_i - mx_i - c)$

$= -(3.4 - 0.2 + 1) = -4.2$

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

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

$= -0.084$

$v_c = \gamma v_c - \eta g_c$

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

$= -0.42$

Step6: $m = m + v_m = 1 + (-0.084) = 0.916$

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

Step7 : Sample = Sample+1

= 1+1 = 2

Step8 : If (sample>ns)

goto step 9

else

goto step 4

Step4 : $g_m = \frac{\partial E}{\partial m} = -(3.8 - (0.916)(0.4) + 1.42)(0.4)$

$= -1.941$

$g_c = \frac{\partial E}{\partial c} = -((3.8) - (0.916)(0.4) + 1.42)$

$= -4.853$

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

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

$= -0.0756 - 0.1941$

$= -0.2697$

$V_c = \gamma V_c - \eta g_c$

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

$= -0.378 - 0.485$

$= -0.863$

Step6 : $m = m + V_m = 0.916 + (-0.2697) = 0.6463$

$C = C + V_c = -1.42 - 0.863 = -2.283$

Step7 : Sample = Sample+1

2+1 = 3

Step8 : if (sample>ns) goto step 9

else

goto step 4

Step9 : iter = iter+1

1+1 = 2

Step10 : if (iter > epochs) goto step 11

else

goto step3

Step3: sample = 1

Step4: $g_m = \frac{\partial E}{\partial m} - [3.4 - (0.646)(0.2) + 2.283)(0.2)]$

$= -1.110$

$g_c = \frac{\partial E}{\partial c} = -(3.4 - (0.646)(0.2) + 2283)$

$= -5.553$

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

$= (0.9)(-0.2697) - [0.1 \times -1.11]$

$= -0.353$

$V_c = \gamma V_c - \eta g_c$

$= (0.9)(-0.883) - (0.1)(-5.553)$

$= -1.332$

Step6: $m = m + V_m = 0.6963 + (-0.353) = 0.293$

$c = c + V_c = -2.283 - 1.332 = -3.615$

Step7: sample = sample + 1

$= 1 + 1 = 2$

Step8: if (sample > n3)

goto step9

else

goto step 4

Step4: $g_m = -(3.8 - (0.293)(0.4) + 3.615)\,0.4$

$= -2.919$

$g_c = -(3.8 - (0.293)(0.4) + 3.615)(0.4)$

$= -7.297$

Step5: $V_m = (0.9)(-0.353) - (-0.1)(-2.919)$

$= -0.6096$

$V_c = (0.9)(-1.332) - (-0.1)(-7.297)$

$= -1.9265$

Step6: $m = m + \nabla m = 0.293 - 0.609 = -0.316$

$C = C + \nabla C = -3.615 - 1.928 = -5.543$

Step7: Sample = sample+1

2+1 = 3

Step8: if (sample>n3)

3 > 2 goto step 9

else

goto step 4

Step9: iter = iter+1

2+1 = 3

Step10: if (iter>epoches)

goto step 11

else

goto step 3

Step11: Print m, C

m = -0.316, C = -5.543.