ASSIGNMENT-9

18K41A0538.

let us consider a sample dataset have 1 input (x_i) and one output (y_i) and number of sample 4, develop a simple linear regression model using momentum optimiser.

Sample	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 calculations for 2 iterations with 1st 2 samples.

Step 1: $[x, y]$ $m = 1, c = -1, \eta = 0.1$, epochs = 2, $\gamma = 0.9$, $v_m = v_c = 0$, ns = 2

Step 2: itr = 1

Step 3: sample = 1

Step 4: $g_m = \frac{\partial \epsilon}{\partial m} = -(y_i - mx_i - c)\, x_i$

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

$= -0.84$

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

$= -(3.4 - 0.2 + 1)$

Step5 = $\nabla m = \gamma \nabla m \cdot \eta g m$

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

$= 0 - 0.084$

$= 0.084$

$\nabla c = \gamma \nabla c = \eta g c$

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

$= -0.42$

Step6 = $m = m + \nabla m$

$= 1 + (-0.84)$

$= 0.916$

$c = c + \nabla c$

$= -1 - 042$

$= -1.42$

Step7: sample+ = 1

1+1 = 2

Step8: if (sample > ns)

goto step -9

2 > 8

else

goto step-4

Step4: $gm = \frac{\partial E}{\partial m} = -(3.8 - 10.916)(0.4) + (1.12)(0.4)$

$= 1.941$

Step5: $gc = \frac{\partial E}{\partial c} = -4.853$

$vm = \gamma vm - \eta gm$

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

$= -0.2697$

$vc = \gamma vc - \eta gc$

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

$= -0.863$

Step 6: $m = m + \nabla m$

$= 0.916 + (-0.2697)$

$= 0.6463$

$c = c + \nabla c$

$= -1 + 42 \cdot 0.863$

$= -2.283$

Step 7: sample = sample + 1

$= 2 + 1 = 3$

Step 8: if (sample > ns)

goto step-9

else

goto step-4

Step 9: itr + = 1

$1 + 1 = 2$

Step 10: if (itr > epoches)

goto step-4

else

goto step-3

Step 3: sample = 1

Step 4: $gm = \frac{\partial \epsilon}{\partial m} = -(3.4 - (0.646)(0.2) + 2.283)(0.2)$

$= -1.110$

$gc = \frac{\partial \epsilon}{\partial c} = -(3.4 - (0.646)(0.2) + 2.283$

$= 5.553$

Step 5: $\nabla m = \delta v m - \eta g m$

$= (0.9)(-0.2697) - [0.1 \times -1.110]$

$= -0.353$

$\Delta c = \Delta vc - \eta gc$

$= [0.9)(0.863) - [0.1 \times -5.53]$

$= -1.332$

Step 6: $m = m + \Delta m$

$= 0.6463 + (-0.353)$

$= 0.293$

$c = c + ve$

$= -2.283 - 1.332$

$= -3.615$

Step 7: sample + = 1

1 + 1 = 2

Step 8: if sample > ns)

2 > 2 goto Step - 9

else

goto Step - 4

Step 4: $gm = -(3.8 - (0.293)(0.4) + 3.615)(0.4)$

$= -2.919$

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

$= -7.297.$

Step 5 = $\Delta m = (0.9)(-0.353) - [0.1 \times -2.919]$

$= -0.6096$

$vc = (0.9)(-1.332) - [-0.1 \times -7.297]$

$= -1.9285$

Step 6: m + = Vm

$0.293 - 0.609 = -0.316$

$c_1 = vc$

$-3.615 - 1.928 = -5.543$

Step 7: sample $+ = 1$

$2+1 = 3$

Step 8: if (Sample > ns)

goto step-9

else

goto step-4

Step 9: itr $+1 = 1$

$2+1 = 3$

Step 10: if (itr > epochs)

goto step-11

else

goto step-3

Step 11: print m, c

$m = -0.316, \quad c = -5.543$