Assignment-5

-18KU1A0491

let us consider a sample dataset have one input (x_i^a) and one output (y_i^a) and number of samples 4. Develop a simple linear regression model using MBGD

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

Batch 1

x	y
0.2	3.4
0.4	3.8

Batch - 2

x	y
0.6	4.2
0.8	4.6

step-1 : [x, y], m = 1, c = -1, η = 0.1, epochs = 2, bs = 2

step-2 : $nb = \frac{ns}{bs} = \frac{4}{2} = 2$

step 3 : itr = 1

step 4 : Batch = 1

step 5 : $\frac{\partial E}{\partial m} = \frac{-1}{bs} \sum_{i=1}^{bs} (y_i - mx_i - c)x_i$

$= -\frac{1}{2}\left[((3.4 - (1)(0.2) + 1)0.2] + [3.8 - 0.4 + 1]0.4\right]$

$= -1.34$

$\frac{\partial E}{\partial c} = -\frac{1}{2}[(3.4 - 0.2 + 1) + (3.8 - 0.4 + 1)] = -4.3$

step 6 : $\Delta m = -(0.1)(-1.34) = 0.134$

$\Delta c = -(0.1)(-4.3) = 0.43$

step 7 : $m = m + \Delta m = 1 + 0.134 = 1.134$

$c = c + \Delta c = -1 + 0.43 = -0.57$

step 8 : Batch + = 1

1 + 1 = 2

step 9 : if (Batch > nb)

goto step-10

2 > 2

else

goto step-5

step 5 : $\frac{\partial E}{\partial m} = -\frac{1}{2}[(4.2 - (1.134)(0.6) + 0.57)0.6 + (4.6) - (1.134)(0.8) + 0.57)0.8]$

$= -2.932.$

$\frac{\partial E}{\partial c} = -\frac{1}{2}[(4.2 - (1.134)(0.6) + 0.57) + (4.6 - (1.134)(0.8) + 0.57)]$

$= -4.1762$

step 6 : $\Delta m = -(0.1)(-2.932) = 0.2932$

$\Delta c = -(0.1)(-4.1762) = 0.41762$

step 7 : $m + = \Delta m = 1.134 + 0.2932 = 1.4272$

$c + = \Delta c = -0.57 + 0.4176 = -0.1523$

step 8 : Batch + = 1

2 + 1 = 3

step 9 : if (batch > nb)

goto step -10

3 > 2

else

goto step - 5

step-10 : ite = ite + 1

1+1 = 2

step-11 : if (ite > epochs)

goto step-12

2 > 2

else

goto step-4

step4 : Batch = 1

step5 : $\frac{\partial E}{\partial m} = \frac{-1}{2}[(3.4 - (1.4272)(0.2) + 0.1523)0.2 +$

$(3.8 - (1.4272)(0.4) + 0.1523)0.4]$

$= -1.0029$

$\frac{\partial E}{\partial c} = \frac{-1}{2}[(3.4) - (1.4272)(0.2) + 0.1523) +$

$(3.8 - (1.4272)(0.4) + 0.1523]$

$= -3.3241$

step-6 : $\Delta m = (-0.1)(-1.0029)$

$= 0.1002$

$\Delta c = (-0.1)(-3.3241)$

$= 0.332$

step-7 : $m_t = \Delta m$

$= 1.4272 + 0.1002 = 1.5274$

$c_t = \Delta c$

$= -0.1523 + 0.332 = 0.1797$

step-8 : Batch t = 1

1+1 = 2.

step-9: if (Batch > nb)

goto step-10

2 > 2

else

goto step-7

step-5: $\frac{\partial E}{\partial m} = -\frac{1}{2}[(4.2-(1.5274)(0.6)-0.1797)0.6 +$

$(4.6-(1.5274)(0.8)-0.1797)0.8]$

$= -2.21$

$\frac{\partial E}{\partial c} = -3.151$

step-6: $\Delta m = -0.1 \times -2.21$

$= 0.221$

$\Delta c = -0.1 \times -3.151 = 0.315$

step-7: $m + \Delta m = 1.5274 + 0.221$

$= 1.748$

$c + \Delta c = 0.1797 + 0.315 = 0.494$

step-8: Batch+ = 1

2+1 = 3

step 9: if (Batch > nb)

goto step-10

else goto step-5

skp-10: if 2 = 1 > 2+1 = 3

step-11: if (il1 > epochs)

3 > 2 goto step-12

else goto step-4

Step-12: print m, c

m = 1.748 , c = 0.494.