ASSIGNMENT-5

Let us consider a sample dataset have one input (x_i) and one output (Y_i) and number of samples of, Develop a SLR model using MBGD?

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 calculations for 2 iterations with bs = 2

	x	y
batch -1	0.2	3.4
	0.4	3.8
batch 2	0.6	4.2
	0.8	4.6

Steps

Step 1 : [x, y], $\eta = 0.1$, epochs = 2, bs = 2

$m = 1, c = -1$

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

step 3: iter = 1

step 4: Batch = 1

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

$= -\frac{1}{2}[(3.4 - 1(0.2) + 1)0.2)$

$+ [3.8 - 0.4 + 1]0.4]$

$= -1.34$

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

$= -4.3$

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 = Batch + 1

$1 + 1 = 2$

step 9: if (Batch > nb)

go to step 10

else

goto step 5

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

$+ (4.6 - (1.134)(0.8) + 0.57)$

$= -4.1762$

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

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

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

$= 1.4272$

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

$= -0.1523$

step 8: Batch = Batch + 1

$\Rightarrow 2 + 1 = 3$

step 9: if (Batch > nb) : go to step 10

$3 > 2$

else go to step 5

step 10: iter = iter + 1

$= 1 + 1 = 2$

Step 11: if (iter > epochs) : go to step 12

2 > 2

else : goto step 4

Step 4: Batch = 1

Step 5: $\frac{\partial E}{\partial m} = -\frac{1}{2}[(3.4) - (1.4272)(0.2) + 0.1523)$

$0.2 + (3.8 - (1.4272)(0.4) + (0.1523)(0.4)]$

$\frac{\partial E}{\partial m} = -1.0029$

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

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

$= -3.3241$

step 6: $\Delta m = (-0.1)(-1.0029) \rightarrow 0.1002$

$\Delta c = (-0.1)\ (-3.3241) \Rightarrow 0.0332$

step 7: $m = m + \Delta m \Rightarrow 1.4272 + 0.1002$

$= 1.5274$

$c = c + \Delta c \Rightarrow -0.1523 + 0.332$

$= 0.1797$

Step 8: Batch = Batch + 1

$1 + 1 = 2$

step 9: if (Batch > nb) goto step 10

else

goto step 5

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

$\left. + [4.6-(1.5274)(0.8)-0.1797)0.8\right]$

$= -2.21$

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

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

$\boxed{\Delta m = 0.221}$

$\Delta C = -0.1 \times -3.151$

$\boxed{\Delta c = 0.315}$

step 7: $m = m + \Delta m$

$= 1.5274 + 0.221 = 1.748$

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

$= 0.494$

step 8: Batch = Batch + 1

$= 2 + 1 = 3$

step 9: if (epochs>
if (Batch > nb) go to step 10

else
goto step 5

step 10: iter = iter+1

2+1 ⇒ 3

step 11: if (iter> epochs) (3>2)

goto step 12

else goto step 4

step 12: Print m+c

m = 1.148

c = 0.494