ASSIGNMENT - 7

18K41A04B2

Let consider a sample dataset having one Input (xi) and one output (yi) and number of samples a develop a sample linear regression model using BGD.

Sample(i)	x_i^a	y_i B
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.

Step1:- [x,Y] , m=1, c=1, n=0.1, epochs = 2, ns = 2

Step2:- iter = 1

Step3:- $\frac{\partial \epsilon}{\partial m} = \frac{-1}{ns} \sum_{i=1}^{ns} (y_i - mx_i - c)x_i$

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

$= -1.34$

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

$= -4.3$

Step4:- $\Delta m = -n \frac{\partial \epsilon}{\partial m}$

$= -0.1 \times -1.34 = 0.134$

$$\Delta c = -\eta \cdot \frac{\partial e}{\partial c}$$

$$= -0.1 \times -4.3$$

$$= 0.43$$

Step 5:- Updating m and c values

$$m = m + \Delta m$$

$$= 1 + 0.134 = 1.134$$

$$c = c + \Delta m = -01 + (4.3)$$

$$= 3.3$$

Step 6:- iter + = 1

$$= 1 + 1 = 2$$

Step 7:- if (iter > epochs) : go to step 8

$$2 > 2$$

else : go to step 3

Step 3:- $\frac{\partial e}{\partial m} = \frac{-1}{2}[(3.4 - (1.134)(0.2) + 0.57)(0.2) +$

$(3.8 - (1.134)(0.4) + 0.57)(0.4)]$

$$= -1.157$$

$$\frac{\partial e}{\partial c} = -\frac{1}{2}[(3.8 + -(1.134)(0.2) + 0.57) +$$

$(3.8 - (1.134)(0.4) + 0.57)]$

$$= -3.829$$

Step 4:- Calculating delta values.

$$\Delta m = -\eta \times \frac{\partial e}{\partial c} = -0.1 \times -1.157$$

$$= 0.1157$$

$$\Delta c = -\eta \times \frac{\partial \epsilon}{\partial c} = -0.1 \times -3.829$$

$$= 0.3829$$

Step 5:- Updating m and c values

$$m = m + \Delta m \Rightarrow 1.134 + 0.1157$$

$$= 1.2497$$

$$c = c + \Delta c = -0.57 + 0.3829$$

$$= -0.187$$

Step 6 :- iter = iter + 1

$$2 + 1 = 3$$

step 7:- if (iter > epochs) : go to step 8

$$3 > 2$$

else : go to step 3

step 8:- $m = 1.2497$, $c = -0.1871$