ASSIGNMENT-7.

18K41A0538

Let us consider a sample dataset have one input (xi4) and one output (yi4) and Number of samples.

4. Develop a simple linear regression model using BGD.

Sample (i)	xi 9	yi 9
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

DO Manual calculations for two iterations with first two samples.

* write the python code to build simple linear regression model using BGD optimizer (consider all 4 samples)

Step 1: [x, y], $m = 1$, $c = -1$, $\eta = 0.1$, epoch = 2, ns = 2

Step 2: itr = 1

Step 3: $\frac{\partial E}{\partial m} = -\frac{1}{ns} \sum_{i=1}^{ns} (y_i - mx_i - c)\, x_i$

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

$= -1.34$

$\frac{\partial \epsilon}{\partial c} = -\frac{1}{2}[(3.4 - 0.2 + 1.1) + (3.8 - 0.4 + 1)]$

$= -4.3$

Step 4 : $\Delta m = -\eta \cdot \frac{\partial \epsilon}{\partial m}$

$= -0.1 \times -1.34$

$= 0.134$

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

$= -0.1 \times -4.3 = 0.43$

Step 5 : $m + \Delta m$

$1 + 0.134$

$= 1.134$

$c + \Delta c$

$= -0.1 \times 4.3$

$= 0.43$

Step 6 : itr $t = 1$

$1 + 1 = 2$

Step 7 : if (itr > epochs)

goto step 8

2 > 3

else

goto step 3

Step 3: $\frac{\partial \epsilon}{\partial m} = -\frac{1}{2}[(3.4 - (1.34)(0.2) + 0.57)(0.2) +$

$(3.8) - (1.34)(0.4) + 0.57)(0.4)]$

$= -1.157.$

$$\Delta c = -\frac{1}{2}\left[(2+(1.134\times(0.2)+0.57))+(3.8)-(1.134)(0.4)+0.57)\right]$$

$$= 3.829$$

Step 4: $\Delta m = 0.1 \times 1.157 = 0.1157$

$\Delta c = -0.1 \times 3.829 = 0.3829$

Step 5: $m + \Delta m$

$= 1.134 + 0.1157$

$= 1.2497$

$c = \Delta c$

$= 2 - 0.57 + 0.3829 = -0.187$

Step 6: itr + = 1

2 + 1 = 3

Step 7: if (itr > epochs)

3 > 2 goto step -8

else

goto step -3

Step 8: m = 1.2497, c = -0.1871