Assignment - 7

Let consider a sample dataset have one Input (x_i) and one output (y_i) and number of samples a develop a sample linear regression model by using BGD

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

→ Do manual calculations for 2 iterations with 1st 2 samples.

step 1 :- $[x, y]$, $m = 1$, $c = -1$, $\eta = 0.1$, epochs = 2,

$ns = 2$

step 2: iter = 1

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

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

$= -1.34$

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

$= -4.3$

step 4: $\Delta m = -\eta \frac{\partial E}{\partial m}$

$= -0.1 \times -1.34 = 0.134$

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

$= -0.1 \times -4.3 = 0.43$

step 5 $m = m + \Delta m = 1 + 0.134 = 1.134$

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

step 6 iter = iter + 1

$= 1 + 1 = 2$

step 7: if (iter > epochs) = goto step 8

$2 > 2$

else goto step 3

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

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

$= -1.157$

&

$\frac{\partial E}{\partial c} = -\frac{1}{2}[(3.4 - (1.134)(0.2) + 0.57) +$

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

$= -3.829$

Step 4 $\Delta m = -0.1 \times -1.457 = 0.1157$

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

Step 5: $m = m + \Delta m \Rightarrow 1.04 + 0.1157 = 1.2447$

$c = c + \Delta c \Rightarrow -0.57 + 0.3829 = -0.187$

step6 iter = iter + 1

= 2 + 1

= 3

step7: if (iter > epochs) goto step8

3 > 2

else goto step3

step8: m = 1.2497 c = -0.1871