Assignment - 1

1. Let us consider a sample dataset have one i/p and one o/p and no of samples a develop a sample linear regression model by using BGD

Sample	x_i	y_i
1	0.2	3.4
2	0.4	3.8
3	0.5	4.2
4	0.6	4.6

Manual Calculations for 2 iterations with 1st 2 samples:

1. (x,y) , m=1, c=-1, η=0.1, epochs = 2, ns=2
2. iter = 1
3. $\frac{\partial E}{\partial m} = \frac{-1}{ns} \sum_{i=1}^{ns} (y_i - mx_i - c)x_i$

$= \frac{-1}{2} \left[(3.4 - 1(0.2) + 1)0.2 + (3.8 - 1(0.4) + 1)0.4 \right] = -1.34$

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

4. $\Delta m = -\eta \frac{\partial E}{\partial m} = -0.1(-1.34) = 0.134$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -0.1 \times -4.3 = 0.43$

5. $m = 1 + 0.13 = 1.13$, $c = -0.1 \times -4.3 = 0.43$
6. iter = 1
7. If (iter > epochs): goto step8

2>2

else

goto step 3

3. $\frac{\partial E}{\partial m} = \frac{-1}{2} \left[(3.4 - (1.13)(0.2) + 0.57)(0.2) + (3.8 - (1.13)(0.4) + 0.57)0.4 \right]$

$= -1.157$

$\frac{\partial E}{\partial c} = \frac{-1}{2} \left[(3.4 - (1.134)(0.2) + 0.57) + (3.8 - (1.134)(0.4) + 0.57) \right]$

$= -3.82$

4. $\Delta m = -0.1(-1.15) = 0.115$, $\Delta C = -0.1(-3.8) = 0.38$

5. $m = 1.13 + 0.11 = 1.24$, $c = -0.52 + 0.38 = -0.18$

6. iter = 3

7. if (iter < epochs) goto step 8

   3 > 2

   else:

   goto step 3

8. $m = 1.24$, $c = -0.18$.