Assignment-7

18K41A0574

a) Develop a simple linear regression model using BGD.

Sample	X	Y
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.

Sol) **Step-1:** $x, y, m=1, c=-1, \eta=0.1$, epochs $=2$, $ns=2$

Step-2: iter $=1$

Step-3: $\frac{\partial E}{\partial m} = -\frac{1}{2}[(3.4-(1)(0.2)+1)0.2+(3.8-(1)(0.4)+1)0.4]$

$= +1.34$

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

$= -4.3$

Step-4: $\Delta m = -0.1 \times (-1.34) = 0.134$

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

Step-5: $m = m + \Delta m = 1 + 0.134 = 1.134$

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

Step-6: iter = 1+1 = 2

Step-7: if (2 > 2)
goto step 8
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: $\Delta m = (-0.1)(-1.157) = 0.1157$

$\Delta c = (-0.1)(-3.829) = 0.3829$

Step-5: $m = m + \Delta m = 1.134 + 0.1157 = 1.2497$

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

Step-6: iter = 2+1 = 3

Step-7: if (3 > 2)
goto step-8

step-8: $m = 1.2497$

$c = -0.187$