→ Assignment 7:

Let consider a simple dataset have one input (xi) and one output (via) and number of samples a develop a simple linear Regression Model by using BGD

Simple (i)	xi a	yi 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 ; η = 0.1, epoches = 2, ns = 2

step 2 : iter = 1

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

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

$= -1.34$

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

$= -4.3$

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

$= -0.1 \times -1.34 = 0.134$

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

$= -0.1 \times -4.3 = 0.43$

Step 4: $\Delta m = -\eta \frac{dE}{dm}$

$= 0.1 \times -1.34 = 0.134$

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

$= -0.1 \times -4.3 = 0.43$

Step 5: $m += \Delta m$

$= 1 + 0.134 = 1.134$

$c += \Delta c$

$= -0.1 \times 4.3 = 0.43$

Step 6: iter += 1

(+1) = 2

Step 7: if (iter > epoches) ; goto Step 8

2 > 2

else goto step 3

Step 3: $\frac{dE}{dm} = -1/2 [(3.4 - (1.134)(0.2) + (0.54)(0.2) +$

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

$= -1.157$

$\frac{dE}{dc} = -1/2 [[(3.4 - (1.134)(0.2) + 0.57) +$

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

$= -3.829$

Step 9: $\Delta m = -0.1 \times -1.157 = 0.1157$

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

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

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

Step 6: iter += 1 $\Rightarrow 2 + 1 = 3$

Step 7: if (iter > epoches) ; goto Step 8

3 > 2

else : goto step 3

Step 8: m = 1.2497 c = -0.1871