Assignment-7:

let consider a sample dataset have one Input (x_i) and one output (y_i^a) 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

→ 00 manual calculations for 2 iterations with 1st 2 samples

step1: $[x,y]$, $m=1$, $c=-1$, $\eta=0.1$, epochs=2, $ns=2$

step2: iter=1

step3: $\dfrac{\partial E}{\partial m} = \dfrac{-1}{ns} \sum_{i=1}^{ns} (y_i - m x_i - c) x_i$

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

$= -1.34$

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

$= -4.3$

step4: $\Delta m = -\eta \dfrac{\partial E}{\partial m}$

$= -0.1 \times -1.34 = 0.134$

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

$= -0.1 \times -4.3 = 0.43$

step5 : $m + = \Delta m$

$= 1 + 0.134 = 1.134$

$c + = \Delta c$

$= -0.1 \times -4.3 = 0.43.$

step6 : $iter + = 1$

$= 1 + 1 = 2$

step7 : if $(iter > epochs)$: goto step8

$2 > 2$

else : goto step 3.

step8 :
$$\frac{\delta E}{\delta m} = -\frac{1}{2}\left[(3.4 - (1.134)(0.2) + 0.57)(0.2) + (3.8 - (1.134)(0.4) + 0.57)(0.4)\right]$$

$= -1.157$

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

$= -3.829$

step4 : $\Delta m = -0.1 \times -1.157 = 0.1157$

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

step5 : $m + = \Delta m \Rightarrow 1.134 + 0.1157 \Rightarrow 1.2497$

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

step6 : $iter + = 1 \Rightarrow 2 + 1 \Rightarrow 3$

step7 : if $(iter > epochs)$: goto step8

$3 > 2$

else : goto step3

step8 : $m = 1.2497$, $c = -0.1871$