Assignment 7

* Batch Gradient descent optimizer

sample (i)	x_i	y_i
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

→ Manual calcutions

→ it$_{size}$ 2

→ $n_s = 2$

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

step2 : it = 1

step3 : $\frac{\partial E}{\partial m} = \frac{-1}{n_s} \sum_{i=1}^{n_s} (y_i - mx_i - c)\, x_i$

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

$$= \frac{-1}{2} \left[(4.2)(0.2) + (4.4)(0.4) \right]$$

$$= \frac{-1}{2} \left[(0.84) + (1\overset{7}{\cancel{8}}.6) \right]$$

$$= \frac{-1}{2} \left[2.6 \right] = -1.3$$

~~Step~~

$$\frac{\partial E}{\partial c} = \frac{-1}{n_s} \sum_{i=1}^{n_s} (y_i - mx_i - c)$$

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

$$+ (3.8 - 1(0.4) + 1)]$$

$$= \frac{-1}{2} [4.2 + 4.4]$$

$$= \frac{-1}{2} [8.6]$$

$$= -4.3$$

step4 : $\Delta m = \frac{-\eta}{n_s} (-1.3)$

$$= \frac{0.1}{2} (1.3)$$

$$= 0.065$$

$$\Delta c = \frac{-\eta}{n_s} (-4.3)$$

$$= \frac{(0.1)(4.3)}{2}$$

$$= 0.215$$

steps; $m = 1 + 0.065 = 1.065$

$c = -1 + 0.215 = -0.785.$

Step6 : $it = it + 1$

$: it = 2$

Step7 : If $(it > epoch)$ $(2 > 2)$

next Step3. ||.

else

go to step3 .

Step3 : $\frac{\partial E}{\partial m} = -\frac{1}{2}\left[\left(\left(3.4 - (1.065)(0.2) + 0.785\right)0.2\right)\right.$

$+ \left(\left(3.8 - (1.065)(0.4) + 0.785\right)0.4\right)\Big]$

$= -\frac{1}{2}\left[\left(3.4 - 0.21 + 0.785\right)0.2 + \left(3.8 - 0.42 + 0.785\right)0.4\right]$

$= -\frac{1}{2}\left[(3.975)\,0.2 + (4.165)\,0.4\right]$

$= -\frac{1}{2}\left[0.79 + 1.66\right)$

$= = -\frac{2.15}{2} = -1.07.$

$$\frac{\partial E}{\partial c} =$$

$$= -\frac{1}{2}\left[(3.4 - 0.21 + 0.785) + (3.8 - 0.42 + 0.785) \right]$$

$$= -\frac{1}{2}\left[(3.975) + (4.165) \right]$$

$$= -\frac{1}{2}\left[8.14 \right]$$

$$= -4.07$$

Step 4 : $\Delta m = -\frac{0.1}{2}(-4.07)$

$$= -0.05$$

$$\Delta c = -\frac{0.1}{2}(-4.07)$$

$$= 0.2$$

Step 5 : $m = 1.065 + 0.05$

$$= 1.11$$

$$c = -0.785 + 0.2$$

$$= -0.585$$

$\therefore m = 1.11, \quad c = -0.585$ ✓