Assignment 5

* Mini batch Gradient descent Algo

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 Calculations

→ $it = 2$

→ $n_s = 4$

→ Steps: $[x, y]$, $m = 1$, $c = -1$, $\eta = +0.1$

epochs $= e$, $n_s = 4$, $bs = 2$

$$nb = (n_s / bs) = 2.$$

Step2: $it = 1$, Step3: $bt = 1$

Step4: $$\frac{\partial E}{\partial m} = -\frac{1}{bs} \sum_{i=1}^{bs} (y_i - mx_i - c) x_i$$

$$= -\frac{1}{2} \left[\left(3.4 - 1(0.2) + 1 \right) (0. \right.$$

$$\left. + \left(\left(3.8 - 1(0.4) \right. \right. \right.$$

$$\left. \left. + 1 \right) (0. \right)$$

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

$$= -\frac{1}{2} \left[0.84 + 17.6 \right]$$

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

$$= -\frac{1}{2}\left[0.84 + 1.76\right]$$

$$= -\frac{1}{2}(2.6) = -1.3$$

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

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

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

$$= -\frac{1}{2}\begin{bmatrix}4.3\\8.6\end{bmatrix}$$

Step 5, $\Delta m = (-\eta)(-1.3)$

$= (-0.1)(-1.3)$

$= 0.13$

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

$= 0.43$

Steps, $m = 1 + 0.13$

$= 1.13$

$c = -1 + 0.43$

$= -0.57$

1.00
0.43
0.57

Step 7 : $bt = 2$

Step 8 : $2 > 2$ false go to step 4.

2 [\

Step4 :

$$= -\frac{1}{2}\Big[\big((4.2 - (1.17)(0.6) + 0.57\big)0.6 + \big(4.6 - (1.17)(0.8) + 0.57\big)0.8\Big)$$

$$= -\frac{1}{2}\big(2.4552 + 3.41\big)$$

$$= -\frac{1}{2}\big[5.865\big)$$

$$= -2.93 \checkmark$$

$$\frac{\partial E}{\partial C} = -\frac{1}{2}\Big[\big((4.2 - (1.13)(0.6) + 0.57\big) + \big((4.6 - (1.13)(0.8) + 0.57\big)\Big)$$

$$= -\frac{1}{2}\big[4.0927 + 4.266\big)$$

$$= -\frac{1}{2}\big[8.358\big)$$

$$= -4.179 .$$

Step5: $\Delta m = (-\eta)(-2.93)$

$= -(0.5)(-2.93)$

$= 0.293$

$\Delta c = (-0.5)(-4.37)$

$= +0.417$

Step6: $= m = 1.13 + 0.293$

$m = 1.423$

1.13
0.293
1.423

$c = -0.57 + 0.417$

$= -0.153$.

step7: $bt = 3$

step8: if $(bt <= nb)$ go to Step4

else next step

step9: $it = 2$

step10: if $(it > epochs)$ next step

else

go to step3.