Assignment - 3.

* Stochastic 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 calc.

Step1 : $[x, y]$, $m = 1$, $c = -1$, $\eta = 0.1$,

epochs = 2

Step2 : ite = 1

Step3 : sample = 1

Step4 :
$$\frac{\partial E}{\partial m} = -(y_i - m(x_i) - c)x_i$$

$$= -(3.4 - 1(0.2) + 1)0.2$$

$$= -0.84$$

$$\frac{\partial E}{\partial c} = -(y_i - m(x_i) - c)$$

$$= -(3.4 - 1(0.2) + 1)$$

$$= -4.2.$$

Step5. $\Delta m = -\eta \left(\dfrac{\partial E}{\partial m} \right)$

$$= (-0.1)(-0.84)$$

$$= 0.084$$

$\Delta c = -\eta \left(\dfrac{\partial E}{\partial c} \right)$

$$= (-0.1)(-4.2)$$

$$= 0.42$$

Step6 : $m = m + \Delta m = 1 + 0.084 = 1.084$

$c = c + \Delta c = -1 + 0.42$

$$= -0.58$$

Step7 : sample++ $= 2$

Step8 : if $(sample > n_s)$ next

else go to step4.

Step4 : $\dfrac{\partial E}{\partial m} = -\left(3.8 - (1.084)(0.4) \right.$

$$\left. + 0.58 \right) 0.4$$

$$= -(3.8 - 0.43 + 0.58) 0.4$$

$$= -(3.95) 0.4$$

$$= -1.58$$

$$\frac{\delta E}{\delta c} = -\left(38 - (1.084)(24) + 0.58\right)$$

$$= -3.95$$

Step5 :

$$\Delta m = -(0.1)(-1.58)$$

$$= 0.158$$

$$\Delta c = -(0.1)(-3.95)$$

$$= 0.395$$

Step6 :

$$m = 1.084 + 0.158$$

$$= 1.242$$

$$c = -0.58 + 0.395$$

$$= -0.185$$

Step7 : $sample = 3$

Step8 :   if $(sample > n_s)$

   next.

Step9 : $it = it + 1$ 2 —

Step10 :   if $(it > epoch)$ 2

   next

   else
   goto Step 3

Step3 : sample = 1

Step4 : $\dfrac{\partial E}{\partial m} = -(y_i - m(x_i) - c) \cdot x_i$

$$= -(3.4 - (1.242)(0.2) + 0.185)0.2$$

$$= -(3.4 - (0.24) + 0.185)0.2$$

$$= -(3.34)(0.2)$$

$$= -0.66$$

$\dfrac{\partial E}{\partial c} = -(3.4 - (0.24) + 0.185)$

$$= -3.34$$

Step5 : $\Delta m = -(0.1)(-0.66)$

$$= 0.066$$

$\Delta c = -(0.1)(-3.34)$

$$= 0.334$$

Step6 : $m = 1.242 + 0.066$

$$= 1.3$$

$c = -0.185 + 0.334$

$$= 0.14$$

step7: sample = 2

step8: if (2 > 2)

neat

else

step4.

step4 : $\dfrac{\partial E}{\partial m} = - \left(3.8 - (1.3)(0.4) \right)$

$- 0.14)$

0.4

$= - \left(3.8 - 0.52 - 0.14 \right)$

0.4

$= - (3.14)(0.4)$

$= - 1.25$

$\dfrac{\partial E}{\partial c} = - \left(3.8 - (1.3)(0.4) - 0.14 \right)$

$= - (3.14)$

Step5; $\Delta m = - (0.1)(-1.25)$

$= + 0.125$

$\Delta c = - (0.1)(-3.14)$

$= + 0.314$

Step6:

$$m = 1.3 + 0.125$$

$$m = 1.425$$

$$c = 0.14 + 0.314$$

$$c = 0.454$$

Step7. sample = 3

Step8: if (3 > 2)

next

Step9) it = 2 + 1 = 3

next

$$m = 1.425$$

$$c = 0.454,$$