

# Assignment - 3

Samples	X	Y
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

Step1:-  $m = 1, c = -1, \eta = 0.1, \text{epochs} = 2, n_s = 2$

Step2:- iter = 1

Step3:- sample = 1

$$\begin{aligned}\underline{\text{Step4:-}} \quad \frac{\partial E}{\partial m} &= -((3.4) - 1(0.2) + 1) \cdot 0.2 \\ &= -0.84\end{aligned}$$

$$\begin{aligned}\frac{\partial E}{\partial c} &= -(3.4 - 1(0.2) + 1) \\ &= -4.2\end{aligned}$$

$$\begin{aligned}\underline{\text{Step5:-}} \quad \Delta m &= -\eta \cdot \frac{\partial E}{\partial m} = -(0.1)(-0.84) \\ &= 0.084\end{aligned}$$

$$\begin{aligned}\Delta c &= -\eta \cdot \frac{\partial E}{\partial c} = -(0.1)(-4.2) \\ &= 0.42\end{aligned}$$

$$\underline{\text{Step6:-}} \quad m = m + \Delta m \Rightarrow 1 + 0.084 = 1.084$$

$$c = c + \Delta c \Rightarrow -1 + 0.42 = -0.58$$

Step7:- sample = sample + 1  
 $\Rightarrow 1 + 1$   
 $\Rightarrow 2$

Step8:- if (sample > n<sub>s</sub>)  
 $2 > 2$   
 $\hookrightarrow \text{False}$

$$\underline{\text{Step 9:}} \frac{\partial E}{\partial m} = -(3.8 - (1.08u)(0.4) + 0.58) 0.4 \\ = -1.5785$$

$$\frac{\partial E}{\partial c} = -(3.8 - (1.08u)(0.4) + 0.58) \\ = -3.9464$$

$$\underline{\text{Step 5:}} \Delta m = -(0.1)(-1.5785) \\ = 0.1578$$

$$\Delta c = -(0.1)(-3.9464) \Rightarrow 0.39$$

$$\underline{\text{Step 6:}} m = m + \Delta m \\ = 1.08 + 0.157 \\ \Rightarrow 1.24$$

$$c = c + \Delta c \\ = -0.58 + 0.39 \Rightarrow -0.18$$

$$\underline{\text{Step 7:}} \text{sample} = \text{sample} + 1 \\ = 2 + 1 \Rightarrow 3$$

$$\underline{\text{Step 8:}} \text{if } (\text{sample} > n_s) \\ 3 > 2$$

↳ True

$$\underline{\text{Step 9:}} \text{iter} = \text{iter} + 1 \Rightarrow 1 + 1 = 2$$

$$\underline{\text{Step 10:}} \text{if } (\text{iter} > \text{epochs})$$

$$2 > 2$$

↳ False

$$\underline{\text{Step 3:}} \text{sample} = 1$$

Step 4:-

$$\frac{\partial E}{\partial m} = -(3 \cdot u - (1.2 \times 0.2) + 0.18) 0.2 \\ = -0.668$$

$$\frac{\partial E}{\partial c} = -(3 \cdot u - (1.2 \times 0.2) + 0.18) \\ = -3.3u$$

Step 5:-  $\Delta m = (-0.1)(-0.668) = 0.0668$

$$\Delta c = (-0.1)(-3.3u) = 0.33$$

Step 6:-  $m = m + \Delta m = 1.2u + 0.066 = 1.3$

$$c = c + \Delta c = 0.18 + 0.33 = 0.15$$

Step 7:- sample = sample + 1  $\Rightarrow 1 + 1 = 2$

Step 8:- if (sample > 75)  
 $2 > 2$   
 $\hookrightarrow$  False

Step 4:-  $- (3.8 - (1.3 \times 0.4) - 0.15) 0.4 \\ = -1.25 \rightarrow \frac{\partial E}{\partial m}$

$$\frac{\partial E}{\partial c} = -(3.8 - (1.3 \times 0.4) - 0.15) \\ = -3.13$$

Step 5:-  $\Delta m = -(0.1)(-1.25) = 0.12$

$$\Delta c = -(0.1)(-3.13) = 0.31$$

Step 6:-  $m = m + \Delta m = 1.3 + 0.12 = 1.42$

$$c = c + \Delta c = 0.15 + 0.31 = 0.46$$

step 7: - sample = Sample + 1  
= 2 + 1  $\Rightarrow$  3

step 8: - if (sample > n\_s)

3 > 2  
 $\hookrightarrow$  TRUE

step 9: - iter = iter + 1

$$= 2 + 1 = 3$$

step 10: - if (iter > epochs)

$$3 > 2$$

$\hookrightarrow$  TRUE

Step 11: - print m & c

$$m = 1.42 ; \quad c = 0.46$$