

Assignment - 5

MBGD.

Samples	x	y
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

<u>batch 1:-</u>		x	y
		0.2	3.4
		0.4	3.8

<u>batch 2</u>		x	y
		0.6	4.2
		0.8	4.6

Step1:- $[x, y], m=1, c=-1, \eta=0.1, \text{epochs}=2, \text{bs}=2$.

Step2:- $n_b = \frac{ns}{bs} = \frac{4}{2} = 2$.

Step3:- $\text{itr} = 1$

Step4:- batch = 1

Step5:-
$$\frac{\partial E}{\partial m} = -\frac{1}{bs} \sum_{i=1}^{bs} (y_i - mx_i - c) \cdot x_i$$

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

$$\frac{\partial E}{\partial m} = -1.34$$

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

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

$$\frac{\partial E}{\partial C} = -4.3$$

$$\text{Step 6:- } \Delta m = -2 \cdot \frac{\partial E}{\partial m} = -0.1(-1.34) \\ = 0.134$$

$$\Delta c = -2 \cdot \frac{\partial E}{\partial c} = -0.1(-4.3) \\ = 0.43$$

$$\text{Step 7:- } m = m + \Delta m = 1 + 0.134 \\ = 1.13$$

$$c = c + \Delta c = -1 + 0.43 \\ = -0.57$$

$$\text{Step 8:- } \text{batch} = \text{batch} + 1 \\ = 1 + 1 \Rightarrow 2.$$

$$\text{Step 9:- if } (\text{batch} > n_b) \\ 2 > 2$$

↳ False

$$\text{Step 5:- } \frac{\partial E}{\partial m} = -\frac{1}{2} \left[(u_2 - (1.13)(0.6) + 0.57) \right. \\ \left. 0.6 + [4.6 - (1.13)(0.8) + 0.57] 0.8 \right]$$

$$\frac{\partial E}{\partial m} = -2.932$$

$$\frac{\partial E}{\partial c} = -\frac{1}{2} \left[(u_2 - (1.13)(0.6) + 0.57) + \right. \\ \left. [4.6 - (1.13)(0.6) + 0.57] \right]$$

$$\frac{\partial E}{\partial c} = -4.17$$

$$\text{Step 6: } \Delta m = (-0.1)(-0.932) = 0.29$$

$$\Delta c = (-0.1)(-0.17) = 0.17$$

$$\text{Step 7: } m = m + \Delta m = 1.134 + 0.29 \\ = 1.42$$

$$c = c + \Delta c = -0.57 + 0.17 \\ = -0.152$$

Step 8: batch + 1 = batch

$$\Rightarrow \text{batch} + 1 = 3$$

Step 9: if (batch > nb)

$$3 > 2 \rightarrow \text{TRUE}$$

Step 10: itr = itr + 1

$$= 1 + 1 \Rightarrow 2$$

Step 11: if (itr > epochs)

\rightarrow False go to step 4

Step 12: batch = 1

$$\text{Step 5: } \frac{\partial E}{\partial m} = -\frac{1}{2} [(3.4 - (1.42)(0.2) + 0.15)]$$

$$0.2 + [(3.8 - (1.42)(0.4) + 0.15)] \\ 0.4]$$

$$\frac{\partial E}{\partial m} = -1.002$$

$$\frac{\partial E}{\partial c} = -\frac{1}{2} [(3.4 - (1.42)(0.2) + 0.15) + \\ (3.8 - (1.42)(0.4) + 0.15)]$$

$$= -3.32$$

Step 6: $\Delta m = (-0.1)(-1.002)$
 $= 0.1002$

$$\Delta c = (-0.1)(-3.32)$$

 $= 0.332$

Step 7: $m = m + \Delta m \Rightarrow 1.427 + 0.1002$
 $\Rightarrow 1.527$

$$c = c + \Delta c \Rightarrow -0.152 + 0.332$$

 $\Rightarrow 0.179$

Step 8: $\text{batch} = \text{batch} + 1$
 $\Rightarrow 1 + 1 \Rightarrow 2$

Step 9: if ($\text{batch} > nb$)
2 > 2 \rightarrow False
 \hookrightarrow goto Step 5

Step 5: $\frac{\partial E}{\partial m} = -1/2 \left[(4.2 - (1.52)(0.6) - 0.17) \right]$
 $0.6 + [4.6 - (1.52)(0.8) - 0.17] \over 0.8 \right]$
 $\Rightarrow -2.21$

$$\frac{\partial E}{\partial c} = -3.15$$

Step 6: $\Delta m = (-0.1)(-2.21) = 0.221$
 $\Delta c = (-0.1)(-3.15) = 0.315$

Step 7: $m = m + \Delta m = 1.527 + 0.221 = 1.74$

$$C = C + \Delta C = 0.179 + 0.315 \Rightarrow 0.49$$

Step 8:- batch = batch + 1
= 2 + 1 = 3

Step 9:- if (batch > nb)

$$3 > 2 \rightarrow \text{TRUE}$$

Step 10:- iter = iter + 1

$$= 2 + 1 = 3$$

Step 11:- if (itr > epochs)

$$3 > 2 \rightarrow \text{TRUE}$$

Step 12:- printing m, c

$$m = 1.74 ; C = 0.49.$$