

## Assignment-5

Step-1:-  $[x_i^a, y_i^a], \eta = 0.01, \text{epochs} = 2, m = 1,$   
 $c = -1, \text{iter} = 1$

$x_i^a$	$y_i^a$
75.1	577.8
74.3	577
88.7	570.9

Iteration-1 (sample-1)

$$\begin{aligned} \text{Step-2:- } \frac{\partial E}{\partial m} \Big|_{m=1} &= \frac{-1}{2} (y_i^a - mx_i^a - c)(x_i^a) \\ &= \frac{-1}{2} [(577.8) - (1)(75.1) + 1)(75.1) + (577 - (1)(74.3) + 1)(74.3) \\ &\quad + (570.9 - (1)(88.7) + 1)(88.7)] \\ &= -59056.31 \end{aligned}$$

$$\begin{aligned} \frac{\partial E}{\partial c} \Big|_{c=-1} &= \frac{-1}{2} (y_i^a - mx_i^a - c)(x_i^a) \\ &= \frac{-1}{2} [(577.8) - (1)(75.1) + 1) + (577 - (1)(74.3) + 1) + \\ &\quad (570.9 - (1)(88.7) + 1)] \\ &= -745.3 \end{aligned}$$

$$\text{Step-3:- } \Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01)(-59056.31) = 590.5631$$

$$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.01)(-745.3) = 7.453$$

$$\text{Step-4:- } m = m + \Delta m = 1 + 590.5631 = 591.5631$$

$$c = c + \Delta c = -1 + 7.453 = 6.453$$

Step-5:-  $iter = iter + 1 = 1 + 1 = 2 > epochs$

repeat step-2

Iteration-2

$$m = 591.5631$$

$$c = 6.453$$

$$\begin{aligned}\text{Step-2:- } \frac{\partial E}{\partial m} \Big|_{m=591.5631} &= \frac{1}{2} [(577.8) - (591.5631)(75.1) - (6.453)] \\ &\quad (75.1) + (577 - (591.5631)(74.3) - (6.453))(74.3) \\ &\quad (570.9 - (591.5631)(88.7) - (6.453))(88.7)) \\ &= -5560504.407\end{aligned}$$

$$\begin{aligned}\frac{\partial E}{\partial c} \Big|_{c=6.453} &= \frac{1}{2} [(577.8) - (591.5631)(75.1) - 6.453] + \\ &\quad (577 - (591.5631)(74.3) - 6.453) + \\ &\quad (570.9 - (591.5631)(88.7) - 6.453)] \\ &= -69572.416\end{aligned}$$

$$\begin{aligned}\text{Step-3:- } \Delta m &= -\eta \frac{\partial E}{\partial m} = -(0.01)(-5560504.407) \\ &= -55605.04\end{aligned}$$

$$\begin{aligned}\Delta c &= -\eta \frac{\partial E}{\partial c} = -(0.01)(-69572.416) \\ &= -695.72\end{aligned}$$

$$\begin{aligned}\text{Step-4:- } m &= m + \Delta m = 591.5631 - 55605.04 \\ &= -55013.4769\end{aligned}$$

$$\begin{aligned}c &= c + \Delta c = 6.453 - 695.72 \\ &= -689.267\end{aligned}$$