Assignment-4(a)

Iteration-0

Sample-1

x_i	y_i
7.6	157
7.1	174

Step 1:- $(7.6, 157)$, $\eta = 0.01$, $m = 1$, $c = -1$

Step 2:- $\left.\frac{\partial E}{\partial m}\right|_{m=1} = -(y_i^a - mx_i^a - c) \times (-x_i^a)$

$= +(157 - 1 \times 7.6 - (-1)) \times (7.6)$

$= (158 - 7.6)(7.6)$

$= (150.4)(7.6)$

$= 1143.04$

$\left.\frac{\partial E}{\partial c}\right|_{c=-1} = -(y_i^a - mx_i^a - c)$

$= -(157 - 1 \times 7.6 - (-1))$

$= -(158 - 7.6)$

$= -150.4$

Step 3: $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01)(1143.04)$

$= -11.430$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.01)(-150.4)$

$= 1.504$

Step 4:- $m = m + \Delta m = 1 + (-11.43) = -10.43$

$c = c + \Delta c = -1 + (1.504) = 0.504$

~~step-2~~

Sample-2

step-1:- $(7.1, 174)$, $\eta = 0.01$, $m = 1$, $c = -1$

step 2:- $\left.\frac{\partial E}{\partial m}\right|_{m=1} = -(y_i^a - m x_i^a - c) - x_i^a$

$= (174 - 1*(7.1) - (-1)) * 7.1$

$= (175 - 7.1) * (7.1)$

$= 167.9 \times 7.1 = 1192.09$

$\left.\frac{\partial E}{\partial c}\right|_{c=-1} = -(y_i^a - m x_i^a - c)$

$= -(174 - 1(7.1) - (-1))$

$= -167.9$

step 3:- $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01)\ 1192.09$

$= -11.920$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.01)\ (-167.9)$

$= 1.679$

step 4:- $m = m + \Delta m = 1 + (-11.920)$

$= -10.920$

$c = c + \Delta c = -1 + 1.679$

$= 0.679$

Iteration-2

Sample-1

step 1:- [7.61, 157], n=0.01, m=-10.43, c=0.504

step 2:- $\left.\frac{\partial E}{\partial m}\right|_{m=-10.43} = (157-(-10.43)(7.61) - 0.504)(7.61)$

$= [157+(10.43)(7.61)-0.504)(7.61)$

$= (156.496+(10.43\times7.61))7.61$

$= (156.496+79.372)7.61$

$= (235.868)7.61$

$= 1794.955$

$\left.\frac{\partial E}{\partial c}\right|_{c=0.504} = -(157-(-10.43)(7.61)-0.54)$

$= -235.868$

step 3:- $\Delta m = n\frac{\partial E}{\partial m} = (-0.01 \times 1794.955)$

$= -17.949$

$\Delta c = -n\frac{\partial E}{\partial c} = (-0.01)\times -235.868$

$= 2.358$

step 4:- $m = m+\Delta m = -10.43+(-17.949)$

$= -28.379$

$c = c+\Delta c = 0.504+2.358$

$= 2.862$

Sample-2

step 1 :- (7.1, 174) , $n = 0.01$, $m = -10.92$, $c = 0.679$

step 2 :- $\left.\frac{\partial E}{\partial m}\right|_{m=-10.92} = (174 - (-10.92)(7.1) - 0.679$

(7.1)

$= (173.321) + ((10.92 * 7.1)))\,7.1$

$= 1781.056$

$\left.\frac{\partial E}{\partial c}\right|_{c=0.679} = -(174 - (-10.92)(7.1) - (-0.679))$

(7.1)

$= -250.853$

step 3 :- $m = -n\frac{\partial E}{\partial m} = -(0.01) \times 1781.056$

$= -17.810$

$\Delta c = -n\frac{\partial E}{\partial c} = -(0.01)(-250.853)$

$= 2.508$

step 4 :-

$m = m + \Delta m$

$= -10.92 - 17.81$

$= -28.73$

$c = c + \Delta c$

$= 0.679 + 2.508$

$= 3.187$