Iteration - 1

x_i y_i

7.6   157   <u>Sample - 1</u>

7.1   174

Step 1 : [7.6, 157] $\eta = 0.01$, $m = 1$, $c = -1$

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

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

$= (150.4)(7.6)$

$= 143.04$

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

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

$= -(158 - 7.6)$

$= -150.4$

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

$= -11.430$

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

$= 1.504$

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

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

Iteration - 2

S_1: [7.6, 157], $\eta = 0.01$, $m = -10.43$, $c = 0.504$.

S_2: $\dfrac{\partial E}{\partial m}\Big|_{m=-10.43} = (157 - (-10.43)(7.61) - 0.54)(7.61)$

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

$$= (156.496 + 79.372)(7.61)$$

$$= 1794.955$$

$\dfrac{\partial E}{\partial c}\Big|_{c=0.504} = -(157 - (-10.43)(7.61) - 0.54)$

$$= -235.868.$$

S_3: $\Delta m = -\eta \dfrac{\partial E}{\partial c} = (-0.01 \times 1794.955) = -17.949$

$\Delta c = -\eta \dfrac{\partial E}{\partial c} = (-0.01)(-235.868)$

$$= 2.358$$

S_4: $m = m + \Delta m = -10.43 + (-17.943)$

$$= -28.379$$

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

$$= 2.862$$

Sample - 2   Iteration - 1

S_1: (7.1, 174) $\eta = 0.01$, $m = 1$, $c = -1$.

S_2: $\dfrac{\partial E}{\partial m}\Big|_{m=1} = -(y_i{}^a - m x_i{}^a - c) - x_i{}^a$.

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

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

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

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

$$= -167.9$$

S_3: $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01)\,1192.09$

$$= -11.920$$

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

$$= 1.679$$

S_4: $m = m + \Delta m = 1 + (-11.920) = -10.920$

$c = c + \Delta c = -1 + 1.679 = 0.679$

Iteration - 2

S_1: $[7.1, 174]$ $\quad \eta = 0.01 \quad m = -10.92$
$\qquad\qquad\qquad\qquad\qquad\qquad c = 0.67$

S_2: $\frac{\partial E}{\partial m}\Big|_{m=-10.92} = (174 - (-10.92)(7.1) -$

$$0.67\,(7.1))$$

$$= (173.3217\,(10.92 + 7.1))\,(7.3)$$

$$= 1781.056$$

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

$$- 0.679))$$

$$= -250.853$$

S_3 :

$$\delta m = -\eta \frac{\delta E}{\delta m} = (-0.01) \times (1781.056)$$

$$= -17.810$$

$$\delta c = -\eta \frac{\delta E}{\delta c} = -(0.01)(-250.853)$$

$$= 2.508$$

S_4 :

$$m = m + \delta m = -10.92 - 17.81$$

$$= -28.73$$

$$c = c + \delta c$$

$$= 0.679 + 2.508$$

$$= 3.187.$$