

Assignment - 4A

Sample - 1 Iteration - 1

x_i	y_i
7.6	157
7.1	124

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

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

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

$$= (150.4)(7.6)$$

$$= 143.04$$

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

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

$$= -(158 - 7.6)$$

$$= -(150.4)$$

Step 3: $\Delta m = -n \frac{\partial E}{\partial m} = -(0.01)(143.04)$

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

$$= 1.504$$

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

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

Iteration-2:

$$S1: (7.6, 157), n = 0.01, m = -10.43, c = 0.504$$

$$\begin{aligned} S2: \frac{\partial E}{\partial m} \Big|_{m=-10.43} &= (157 + (-10.43)(7.61) - 0.504)(7.61) \\ &= (157 + (-10.43)(7.61) - 0.504)(7.61) \\ &= (56.496 + 79.372)(7.61) \\ &\approx 1794.955 \end{aligned}$$

$$\begin{aligned} \frac{\partial E}{\partial c} \Big|_{c=0.504} &= (157 - (-10.43))(7.61) \\ &\approx -235.868 \end{aligned}$$

$$S3: \Delta m = -n \frac{\partial E}{\partial c} = (0.01 \times 1794.955) = -17.949$$

$$\begin{aligned} \Delta c &= -n \frac{\partial E}{\partial c} = (-0.01)(-235.868) \\ &\approx -2.379 - 2.358 \end{aligned}$$

$$\begin{aligned} S4: m &= m + \Delta m = -10.43 + (-17.949) \\ &= -28.379 \\ c &= c + \Delta c = 0.504 + 2.358 \\ &= 2.862 \end{aligned}$$

Sample-2

Iteration-1

$$S1: (7.1, 174), n = 0.01, m = 1, c = -1$$

$$\begin{aligned} S2: \frac{\partial E}{\partial m} \Big|_{m=1} &= -(y_i^a - mx_i^a - c) - x_i^a \\ &= (174 - 7.1 - (-1)) + 7.1 \\ &= (175 - 7.1)(7.1) \end{aligned}$$

$$\frac{\partial E}{\partial c} \Big|_{c=1} = -(y_i^a + mn_i^o - c) \\ = -(174 - (7.1) - 61) \\ \approx -167.9$$

$$S3: \Delta m = -n \frac{\partial E}{\partial m} = -(0.01) \cdot 1192.09 \\ = -11.920$$

$$\Delta c = -n \frac{\partial E}{\partial c} = (0.01)(-167.9) \\ = -1.679$$

$$S4: m = m + \Delta m = 1 + (-11.920) = -10.920$$

$$c = c + \Delta m = 1 + -1.679 = 0.321$$

Iteration-2:

$$S1: [1.1, 174], n = 0.01, m = -10.92, c = 0.321$$

$$S2: \frac{\partial E}{\partial m} \Big|_{m=-10.92} = (174 - (-10.92))(7.1) - 0.67(7.1) \\ = (173.321 + (10.92 + 7.1))(7.1) \\ = 1781.056$$

$$\frac{\partial E}{\partial c} \Big|_{c=0.321} = -(174 - (-10.92))(7.1) - 0.67(7.1) \\ = -250.853$$

S3:

$$S_3: \Delta m = -n \frac{\partial E}{\partial m} = (0.01) \times (1781.056)$$

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

$$= 2.508$$

$$S_4: m = m + \Delta m = -10.92 - 17.81$$

$$= -28.73$$

$$c = c + \Delta c$$

$$= 0.679 + 2.508$$

$$= 3.187$$