

$x_i$	$y_i$
7.6	157
7.1	174

### Sample - 1

#### Iteration - 1

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

$$\begin{aligned}
 \text{Step 2 :- } \frac{\partial E}{\partial m} \bigg|_{m=1} &= -(y_i^a - mx_i^a - c) \times (-x_i^a) \\
 &= -(157 - 1(7.6) - (-1))(-7.6) \\
 &= (158 - 7.6)(7.6) \\
 &= (150.4)(7.6) \\
 &= 1143.04
 \end{aligned}$$

$$\begin{aligned}
 \frac{\partial E}{\partial c} \bigg|_{c=-1} &= -(y_i^a - mx_i^a - c) \\
 &= -(157 - 1(7.6) - (-1)) \\
 &= -(158 - 7.6) \\
 &= -150.4
 \end{aligned}$$

$$\begin{aligned}
 3) \Delta m &= -\eta \frac{\partial E}{\partial m} = -(0.01)(1143.04) \\
 &= -11.430
 \end{aligned}$$

$$\begin{aligned}
 \Delta c &= -\eta \cdot \frac{\partial E}{\partial c} = -(0.01)(-150.4) \\
 &= 1.504
 \end{aligned}$$

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

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

## Iteration 2

$$1) [7.6, 157], n=0.01, m=-10.43, c=0.504$$

$$\begin{aligned} 2) \frac{\partial E}{\partial m} \Big|_{m=-10.43} &= -(157 - (-10.43)(7.6) - 0.504)(-7.6) \\ &= (157 + 10.43(7.6) - 0.504)(7.6) \\ &= (156.496 + 79.268)(7.6) \\ &= (235.764)(7.6) \\ &= 1791.8 \end{aligned}$$

$$\begin{aligned} \frac{\partial E}{\partial c} \Big|_{c=0.504} &= -(157 - (-10.43)(7.6) - 0.504) \\ &= -235.764 \end{aligned}$$

$$\begin{aligned} 3) \Delta m &= -\eta \frac{\partial E}{\partial m} = -(0.01)(1791.8) \\ &= -17.918 \end{aligned}$$

$$\begin{aligned} \Delta c &= -\eta \frac{\partial E}{\partial c} = -(0.01)(-235.764) \\ &= 2.357 \end{aligned}$$

$$\begin{aligned} 4) m &= m + \Delta m = -10.43 + (-17.918) \\ &= -28.348 \end{aligned}$$

$$\begin{aligned} c &= c + \Delta c = 0.504 + 2.357 \\ &= 2.861 \end{aligned}$$

## Sample 2

### Iteration 1

1)  $[7.1, 174], n=0.01, m=1, c=-1$

$$\begin{aligned} 2) \frac{\partial E}{\partial m} \Big|_{m=1} &= -(y_i^a - mv_i^a - c)(-v_i^a) \\ &= (174 - 1(7.1) - (-1))(7.1) \\ &= (175 - 7.1)(7.1) \\ &= 167.9(7.1) \\ &= 1192.09 \end{aligned}$$

$$\begin{aligned} \frac{\partial E}{\partial c} \Big|_{c=-1} &= -(y_i^a - mv_i^a - c) \\ &= -(174 - 1(7.1) - (-1)) \\ &= -167.9 \end{aligned}$$

$$\begin{aligned} 3) \Delta m &= -\eta \frac{\partial E}{\partial m} \Big|_{m=1} = -(0.01)(1192.09) \\ &= -11.92 \end{aligned}$$

$$\begin{aligned} \Delta c &= -\eta \cdot \frac{\partial E}{\partial c} \Big|_{c=-1} = -(0.01)(-167.9) \\ &= 1.679 \end{aligned}$$

$$\begin{aligned} 4) m &= m + \Delta m = 1 + (-11.92) \\ &= -10.92 \end{aligned}$$

$$\begin{aligned} c &= c + \Delta c = -1 + 1.679 \\ &= 0.679 \end{aligned}$$

## Iteration 2

$$1) [7.1, 174], n=0.01, m=-10.92, c=+0.679$$

$$\begin{aligned} 2) \frac{\partial E}{\partial m} \Big|_{m=-10.92} &= -(174 - (-10.92)(7.1) - 0.679)(-7.1) \\ &= (173.391 + 77.532)(7.1) \\ &= (250.853)(7.1) \\ &= 1781.056 \end{aligned}$$

$$\begin{aligned} \frac{\partial E}{\partial c} \Big|_{c=+0.679} &= -(174 - (-10.92)(7.1) - 0.679)(7.1) \\ &= -250.853 \end{aligned}$$

$$\begin{aligned} 3) \Delta m &= -\eta \cdot \frac{\partial E}{\partial m} = -(0.01)(1781.056) \\ &= -17.810 \end{aligned}$$

$$\begin{aligned} \Delta c &= -\eta \cdot \frac{\partial E}{\partial c} = -(0.01)(-250.853) \\ &= 2.508 \end{aligned}$$

$$\begin{aligned} 4) m &= m + \Delta m = -10.92 - 17.81 \\ &= -28.73 \end{aligned}$$

$$\begin{aligned} c &= c + \Delta c = 0.679 + 2.508 \\ &= 3.187 \end{aligned}$$