

Assignment - 5

Iteration-1

$$\eta = 0.1, m = 1, c = -1$$

x	y
75.1	577.8
74.3	577
88.7	570.9

$$\begin{aligned}\frac{\partial E}{\partial m} &= -\frac{1}{2} \left[((y_{a1} - mx_1 - c) * x_1) \right. \\ &\quad \left. + ((y_{a2} - mx_2 - c) * x_2) + ((y_{a3} - mx_3 - c) * x_3) \right] \\ &= -\frac{1}{2} \left[((577.8 - (1)(75.1) + 1) * 75.1) + ((577 - (1)(74.3) + 1) * 74.3) + \right. \\ &\quad \left. ((570.9 - (1)(88.7) + 1) * 88.7) \right] \\ &= -5905.631\end{aligned}$$

$$\begin{aligned}\frac{\partial E}{\partial c} &= -\frac{1}{2} \left[(y_{a1} - mx_1 - c) + (y_{a2} - mx_2 - c) + (y_{a3} - mx_3 - c) \right] \\ &= -\frac{1}{2} [503.7 + 503.7 + 483.2] \\ &= -745.3\end{aligned}$$

$$\begin{aligned}\Delta m &= -\eta \cdot \frac{\partial E}{\partial m} = -(0.1)(-5905.631) \\ &= 5905.631\end{aligned}$$

$$\Delta c = -\eta \cdot \frac{\partial E}{\partial c} = -(0.1)(-745.3) = 74.53$$

$$m = 1 + 5905.631 = 5906.631$$

$$c = -1 + 74.53 = 73.53$$

Iteration-2

$$\begin{aligned}\frac{\partial E}{\partial m} &= \frac{-1}{2} \left[((577.8 - (5906.631)(75.1) - 73.53) * 75.1) \right. \\ &\quad + ((577 - (5906.631)(74.3) - 73.53) * 74.3) + \\ &\quad \left. ((570.9 - (5906.631)(88.7) - 73.53) * 88.7) \right]\end{aligned}$$

$$= \frac{-1}{2} [-112273085.835]$$

$$= 56136542.928$$

$$\begin{aligned}\frac{\partial E}{\partial c} &= \frac{-1}{2} \left[(577.8 - (5906.631)(75.1) - 73.53) \right. \\ &\quad + (577 - (5906.631)(74.3) - 73.53) \\ &\quad \left. + (570.9 - (5906.631)(88.7) - 73.53) \right]\end{aligned}$$

$$= \frac{-1}{2} [-1404863.731]$$

$$= 702431.865$$

$$\Delta m = -(0.1)(56136542.928) = -5613654.293$$

$$\Delta c = -(0.1)(702431.865) = -70243.187$$

$$m = 5906.631 + (-5613654.293)$$

$$= -5607747.662$$

$$c = 73.53 - 70243.187$$

$$= -70169.657$$