Assignment

5A

Data

x	y
75.1	577.8
74.3	577
88.7	570.9

$Y_p \rightarrow$ Predicted Y

$Y_a \rightarrow$ Actual Y

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

$$\frac{\partial E}{\partial m} = -\frac{1}{2}\left[\left(\left(Y_{a1} - mx_1 - c\right) * x_1\right) + \left(\left(Y_{a2} - mx_2 - c\right) * x_2\right) + \left(\left(Y_{a3} - mx_3 - c\right) * x_3\right)\right]$$

$$\frac{\partial E}{\partial m} = -\frac{1}{2}\left[\left(\left(577.8 - (1)(75.1) + 1\right) * 75.1\right) + \left(\left(577 - (1)(74.3) + 1\right) * 74.3\right) + \left(\left(570.9 - (1)(88.7) + 1\right) * 88.7\right)\right]$$

$$= -\frac{1}{2}\left[37827.87 + 37421.91 + 42859.84\right]$$

$$\frac{\partial E}{\partial m} = -59056.31$$

$$\frac{\partial E}{\partial c} = -\frac{1}{2}\left[(Y_{a1} - mx_1 - c) + (Y_{a2} - mx_2 - c) + (Y_{a3} - mx_3 - c)\right]$$

$$= -\frac{1}{2}\left[503.7 + 503.7 + 483.2\right] = -745.3$$

$$\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.1)(-59056.31)$$

$$= 5905.631$$

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

$$m = 1 + 5905.631 = \underline{5906.631}$$

$$c = -1 + 74.53 = \underline{73.53}$$

→ Iteration = 2, $\eta = 0.1$, $m = 5906.631$, $c = 73.53$

$$\frac{\partial E}{\partial m} = -\frac{1}{2}\Big[\big((577.8 - (5906.631)(75.1) - 73.53) * 75.1\big)$$
$$+ \big((577 - (5906.631)(74.3) - 73.53) * 74.3\big)$$
$$+ \big((570.9 - (5906.631)(88.7) - 73.53) * 88.7\big)\Big]$$

$$= -\frac{1}{2}\left[-112273085.855\right] = 56136542.928$$

$$\frac{\partial E}{\partial c} = -\frac{1}{2}\left[\left(577.8 - (5906.631)(75.1) - 73.53\right) + \left(577 - (5906.631)(74.3) - 73.53\right) + \left(570.7 - (5906.631)(88.7) - 73.53\right)\right]$$

$$\frac{\partial E}{\partial c} = -\frac{1}{2}\left[-1404863.731\right] = 702431.865$$

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

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

$$m = 5906.631 + (-5613654.293) = -5607747.662$$

$$c = 73.53 - 70243.187 = -70169.657$$