Assignment - 5

Iteration - 1

x_i	y_i
75.1	577.3
74.3	577
88.7	570.9

Step 1: $\eta = 0.01$, iter = 1, $m = 1$, $c = -1$, epochs = 2

Step 2: $\frac{\partial E}{\partial m}\Big|_{m=1} = -\frac{1}{3}\left((577.3 - 1 + (75.1) - (-1)) * 75.1\right) + \left((577 - 1 \times 74.3 + 1) \times 74.3\right) + \left((570.9 - 1 \times 88.7 + 1) \times 88.7\right)$

$= -39370.873$

$\frac{\partial E}{\partial c}\Big|_{c=1} = -\frac{1}{3}\sum (y - mx_i - c)$

$= -\frac{1}{3}\left[(577.3 - 1(75.1) - (-1)) + (577 - 1 \times 74.3 - (-1)) + (570.9 - 1 \times (88.7) - (-1))\right]$

$= -496.86$

Step 3: $\Delta m = -(0.01)(-39370.873) = 393.70$

$\Delta c = -(0.01)(-496.86) = 4.96$

Step 4: $m = 393.70 + 1 = 394.70$

$c = -1 + 4.96 = 3.96$

Step 5: iter = iter + 1 = 1 + 1 = 2

Iteration - 2

Step 1: $\eta = 0.01$, $m = 394.709$, $c = 3.96$, iter = 2, epochs = 2

Step 2: $\frac{\partial E}{\partial m}\Big|_{m=394.70} =$

$-\frac{1}{3}\left((577.3 - ((394.70) \times 75.1) - 3.96) \times 75.1\right) +$

$\left((577.0 - (394.70) \times (74.3) - 3.96) \times 74.3\right) +$

$\left((570 - (394.70) \times (88.7) - (3.96) \times 88.7)\right]$

$$= 533785 1.23$$

$$\frac{\partial E}{\partial c} = -\frac{1}{3}\left[\left(577.8 - \left(\left(394.70\right) \times 75.1\right) - 3.96\right) + \left(577 - \left(394.70\right) \times 74.3\right) - 3.96\right) + \left(570.9 - \left(394.70\right) \times 88.7\right) - 3.96\right)\Big]$$

$$= 30755.292$$

Step 3 : $\Delta m = -0.01\left(533785 1.303\right)$

$$= -5337 8.51$$

$$\Delta c = -0.01\left(30758.292\right)$$

$$= -307.58$$

Step 4 : $m = 394.70 - 53378.51$

$$= -52983.805$$

$$c = 3.96 + \left(-307.58\right)$$

$$= -303.58$$