Assignment - 5

1. Read data $\{x_1 x_2 x_3 y\}$

L-3	L-2	L-1	L
5551.822	4983.17	4988.39620	5072.95
4923.1784	4982.39	5072.95	5196.25

2. Data preperation using normalization

L-3	L-2	L-1	L
0.397	0.293	0.276	0.310
0.293	0.276	0.310	0.332

3. Initialization $m_1=1$, $m_2=1$, $m_3=1$

max = iter hw, eta = 0.1, e = -1, epoch

4. Set iter = 1 , $n_s = 2$

5. Set sample = 1.

6. x_1 = data['L-3'], x_2 = data['L-2']

x_3 = data['L-1'], Y = data['L']

$$\frac{dE}{dm_1} = -(Y - m_1 x_1 - m_2 x_2 - m_3 x_3 - q$$

$$= -(0.310 - 1(0.397) - 01(0.2$$

$$-1(0.276) + 1)0.$$

$$= 0.136568$$

$$\frac{dE}{dw_2} = -(y - w_1 x_1^i + w_2 x_2^i - w_3 x_3^i) x_2^i$$

$$= -(0.310 - 1(0.397) - 1(0.283) - 1(0.267) + 1)$$

$$= -0.344$$

2. $\Delta w_1 = -\eta \frac{dE}{dw_1} = -0.1(0.136) = 0.0136$

$\Delta w_2 = -\eta \frac{dE}{dw_2} = -0.1(0.10079) = 0.01$

$\Delta w_3 = -\eta \frac{dE}{dw_3} = -0.1(-0.094) =$ [redacted]

0.0014

3. $w_1 = w_1 + \Delta w_1 = 1 + 0.0136 = 1.0136$

$w_2 = w_2 + \Delta w_2 = 1 + 0.01 = 1.01$

$w_3 = w_3 + \Delta w_3 = 1 + 0.0014 = 1.0014$

$C = C + \Delta C = -1 + 0.0344 = -0.9656$

4. sample(i) = sample(i) + 1

$i = i + 1 = 2$

if (sample(i) $\leq n$)

if ($2 \leq 2$) true → step (6)

5. sample = 2

6. $\frac{dE}{dw_1} = -(0.332) - 1((1 \cdot 136)(0.293)$

$= -0.1205$

$$\frac{df}{dm_2} = -(1.332) - 1.0136(0.293) - 1.011(29$$

$$= -0.11355$$

$$\frac{df}{dm_3} = -((0.332 - 1.0136(0.293) - 1.01$$
$$(0.236) - 1.009(0.310)$$
$$+ 0.965)0.310$$

$$= -0.411$$

7. $\Delta m_1 = -\eta \frac{df}{dm_1} = (0.1)(0.1205) = 0.0120$

$\Delta m_2 = -\eta \frac{df}{dm_2} = -(0.1)(0.11355) = 0.011$

$\Delta m_3 = -\eta \frac{df}{dm_3} = -(0.1)(-0.411) = 0.041$

8. $m_1 = \Delta m_1 + m_1 = 1.025$

$m_2 = m_2 + \Delta m_2 = 1.021$

$m_3 = m_3 + \Delta m_3 = 1.012$

$c = c + \Delta c = 0.554$

9. sample(i) = sample(i) + 1

= 2 + 1 = 3

10. if (sample(i) ≤ n_s)

if (3 ≤ 2) false → next step

11. iter = iter + 1 = 1 + 1 = 2

12. if (iter ≤ epochs)

if (2 ≤ 1) → false. next step

13. Stop, print m & c → m = [1.025, 1.0

c = [0.554 1.0]