Assignment-5

manual calculation

① Data $[x_1, x_2, x_3, y]$

L[r-3]	L[r-2]	L[r-1]	L[r]
5551.822	4983.17	4888.39688	5072.95
4983.17184	4888.39	5672.95	51.962

② Data Pre processor

L[r-3]	L[r-2]	L[r-1]	[y]
0.397	0.293	0.276	0.310
0.293	0.836	0.310	0.832

③ initialization $m_1 = 1$ $m_2 = 1$ $m_3 = 1$

max iter = 1000, eta = 0.1, c = -1 epoch = 1

④ set iter = 1

⑤ set sample = 1

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

x_3 = data[L[r-1]], y = data[L[r]]

$$\frac{d\epsilon}{dm_1} = -(y - m_1x_i - m_2x_i - m_3x_i - c)x_i$$

$$= -10.30 - 1(0.397) - 1(0.293) - 1(0.276) + 1(0.397)$$

$$= 0.136568$$

$$\frac{d\epsilon}{dm_2} = -(y - m_1x_1 + m_2x_2 - c)x_2$$

$$= -(0.310 - 1(0.397) - 1(0.293) - 1(0.296) + 1)\,0.293$$

$$= -0.100792$$

$$\frac{dE}{dm_3} = -(0.310 - 1(0.397) - 1(0.293) - 1(0.276) + 1)$$

$$= 0.344$$

7) $\Delta m_1 = -\eta \frac{dE}{dm_1} = -0.1(0.136) = 0.0136$

$\Delta m_2 = -\eta \frac{dE}{dm_2} = -0.1(-0.10079) = 0.01$

$\Delta m_2 = -\eta \frac{dE}{dm_3} = -0.1(0.0094) = 9.4 \times 10^{-3}$

$\Delta C = -\eta \frac{dE}{dC} = -0.1(0.344) = 0.0344$

8) $m_1 = m_1 + \Delta m_1 = 1 + 0.0136 = 1.0136$

$m_2 = m_2 + \Delta m_2 = 1 + 0.01 = 1.01$

$m_3 = m_3 + \Delta m_3 = 1 + 9.4 \times 10^{-3} = 1.0094$

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

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

$i = 1 + 1 = 2$

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

if (2 $\leq$ 2) true $\rightarrow$ step 6

6) sample = 2

$$\frac{dE}{dm_1} = -(0.332) - 1(1.0136)(0.293)$$

$$= -(1.01)(0.276) - 1.0094(0.310 + 0.9656)0.293$$

$$= -0.1805.$$

$$\frac{dE}{dm_2} = -(10.332) - 1.0136(0.293) - 1.011(0.296)$$

$$= -1.009(0.310) + 0.965)\ 0.276$$

$$= -0.11355$$

$$\frac{dG}{dm_3} = -(10.332 - 1.0136\ (0.293) - 1.01\ (0.236)$$

$$-1.009\ (0.310) + 0.965)\ 0.310$$

$$= -0.127$$

$$\frac{dE}{dP} = -0.411$$

(7) $\Delta m_1 = -\eta \frac{dG}{dm_1} = -(0.1)\ (-0.1205) = 0.01205$

$\Delta m_2 = -\eta \frac{dG}{dm_2} = -0.1(-0.11355) = 0.0110$

$\Delta m_3 = -\eta\ dG/dm_3 = -0.1(-0.127) = 0.0127$

$\Delta C = -\eta\ dE/dC = -0.1(-0.411) = 0.041$

(8) $m_1 = m_1 + \Delta m_1 = 1.0136 + 0.01205 = 1.025$

$m_2 = m_2 + \Delta m_2 = 1.01 + 0.0110 = 1.021$

$m_3 = m_3 + \Delta m_3 = 1.00 + 0.0127 = 1.012$

$C = C + \Delta C = -0.9656 + 0.411 = -0.554$

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

(i) = 2 + 1 = 3

10. if (sample (i) ≤ n2)

if (3 ≤ 2) False → next step

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

12 if (iter ≤ epoch2)

if (2 ≤ 1) → false → next step

13. stop

print m and c

m = [1.025, 1.021, 1.012]

c = [-0.554.