Assignment – 13

x	y
0.2	3.4
0.4	3.8
0.6	4.2
0.8	4.6

S-1:- $[x,y]$, $m=1$, $c=-1$,

epochs $=2$, $G_m = G_c = 0$,

$\eta = 0.1$, $\varepsilon = -10^{-8}$

S-2:- $itr = 1$

S-3:- sample $= 1$

S-4:- $g_m = -(3.4 - (1)(0.2) + 1) \, 0.2 = -0.84$

$g_c = -(3.4 - (1)(0.2) + 1) = -4.2$

S-5:- $G_m = 0 + (-0.84)^2 = 0.7056$

$G_c = 0 + (-4.2)^2 = 17.64$

S-6:- $\Delta m = -\dfrac{\eta}{\sqrt{G_m + \varepsilon}} \, g_m = \dfrac{-0.1 \times 0.8}{\sqrt{0.7 + 10^{-8}}} = 0.09$

$\Delta c = \dfrac{-\eta}{\sqrt{G_c + \varepsilon}} \, g_c = \dfrac{-0.1 \times 0.09}{\sqrt{17.6 + 10^{-8}}} = 0.09$

S-7:- $m = m + \Delta m = 1 + 0.09 = 1.09$

$c = c + \Delta c = -1 + 0.09 = -0.91$

S-8:- sample $=$ sample $+ 1$

$= 1 + 1 = 2$

S-9:- if $(\text{sample} > n_s)$ go to next step

$2 > 2$

else

step -4

1

S-4 :- $g_m = -(3.8 - (1.09)(0.4) + 0.91) \, 0.4$

$$g_m = -1.7$$

$$g_c = (-3.8 - (1.09)(0.4) + 0.91) = -4.27$$

S-5 :- $G_m = 0.70 + (-1.7)^2 = 3.59$

$$G_c = 17.64 + (-4.27)^2 = 35.37$$

S-6 :- $\Delta m = \dfrac{-0.1 \times -1.7}{\sqrt{3.59 + 10^{-8}}} = 0.08$

$$\Delta c = -\dfrac{0.1 \times -4.27}{\sqrt{35.8 + 10^{-8}}} = 0.07$$

S-7 ⊢ $m = m + \Delta m = 1.09 + 0.08 = 1.17$

$$c = c + \Delta c = -0.91 + 0.07 = -0.84$$

S-8 ⊢ sample = sample + 1

$$= 2 + 1 = 3$$

S-9 ⊢ if (sample > ns)

$$3 > 2$$

goto ⑩

S-10⊢ ite + = 1 ⟹ 1 + 1 = 2

S-11⊢ if (ite > epochs) goto 12

$$2 > 2$$

else
    goto S-3

2

S-3 :- sample = 1

S-4 ⊦ $g_m = (-3.4 - (1.17)(0.2) + 0.84)\ 0.2$

$= -0.80$

$g_c = -(13.4 - (1.17)(0.2) + 0.84) = -4.0$

S-5 ⊦ $G_m = 3.59 + (-0.80)^2 = 4.23$

$G_c = 35.89 + (-4.0)^2 = 51.89$

S-6 ⊦ $\Delta m = \dfrac{-0.1}{\sqrt{4.23 + 10^{-8}}} \times -0.80 = 0.038$

$\Delta c = \dfrac{-0.1 \times -4.0}{\sqrt{51.84 + 10^{-8}}} = 0.05$

S-7 ⊦ $m = m + \Delta m = 0.038 + 1.17 = 1.208$

$c = c + \Delta c = -0.84 + 0.05 = -0.79$

S-8 :- if (sample > n_s) goto S-10

else goto S-4

S-4 ⊦ $g_m = -(3.8 - (1.20)(0.4) + 0.79) \times 0.4$

$= -1.64$

$g_c = -(3.8 - (+1.20)(0.4) + 0.79) = -4.11$

S-5 ⊦ $G_m = 4.23 + (-1.64)^2 = 6.9$

$G_c = 51.89 + (-4.11)^2 = 68.7$

S-6 ⊦ $\Delta m = \dfrac{-0.1 \times -1.64}{\sqrt{6.9 + 10^{-8}}} = 0.06$

$\Delta c = \dfrac{-0.1 \times -4.11}{\sqrt{68.7 + 10^{-8}}} = 0.04$

3

S-7 ⊢ $m_{new} + \Delta m = 1.208 + 0.06$

$$= 1.26$$

$$c = c + \Delta c = -0.79 + 0.04$$

$$= -0.75$$

S-8 ⊢ Sample = Sample + 1

$$= 2 + 1 = 3$$

S-9 :- if (Sample > ns) goto S-10

$$3 > 2$$

else goto ④

S-10 ⊢ its + 1 = 2 + 1 = 3

S-11 :- if (ita > epochs)

goto S-12

else

goto S-3

S-12 :- m = 1.76

$$c = -0.75$$