Assignment - II

Manual Calculation for two iterations with first two samples (NAG optimizer)

Sample	x	y
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

Step1 $\eta = 0.1$, $m = 1$, $c = -1$, $v_m = 0$, $v_c = 0$, $\gamma = 0.9$, epochs = 2

step2 itr = 1

step3 sample = 1

step4 ~~$y = mx + c = 0$~~

$$g_m = \frac{\partial E}{\partial m} = -(y_i - (m + \gamma v_m)x_i - (c + \gamma v_c))x_i$$

$$= -(3.4 - (1 + 0.9(0))0.2 - (-1 + (0.9)0))0.2$$

$$= 0.84$$

$$g_c = \frac{\partial E}{\partial c} = -(y_i - (m + \gamma v_m)x_i - (c + \gamma v_c))$$

$$= -(3.4 - (1 + 0.9(0))0.2 - (-1 + (0.9)0))$$

$$g_c = -4.2$$

step5 $v_m = \gamma v_m - \eta g_m$

$= (0.9)0 - (-0.1)\times(-0.84) = -0.084$

$v_c = \gamma v_c - \eta g_c$

$= (0.9)0 - (-0.1)(-4.2) = -0.42$

step6: $m = m + v_m = 1 - 0.084 = 0.916$

$c = c + v_c = -1 - 0.42 = -1.42$

step7 sample+=1 ⇒ 2

step8: if(sample>ns)
goto step 9(next)

else
goto step4

step4: $g_m = \frac{\partial E}{\partial m} = -(3.8 - (0.916 + (0.9 \times -0.084))0.4$

$-(-1.42 + (0.9)(-0.42))\ 0.4$

$g_m = -1.983$

$g_c = \frac{\partial E}{\partial c} = -4.959$

step5 $v_m = \gamma v_m - \eta g_m$

$= (0.9 \times -0.084) - (-0.1 \times -1.983) = -0.2739$

$v_c = (0.9 \times -0.42) - (-0.1 \times -4.959) = -0.873$

step6 $m = m + v_m$

$= 0.916 - 0.2739 = 0.6421$

$c = c + v_c = -1.42 - 0.8739 = -2.293$

step7 sample+1 ⇒ 3

step8: if (sample > ns)

3 > 2 ✓

goto next

step9: iter+1 ⇒ 2

step10: if (iter > epochs)

2 > 2X

goto step3

step3 sample=1

step4: $\frac{\partial E}{\partial m} = -[(3.4 - (0.642 + (0.9 * 0.273)) \times 0.2 - (-2.29 + (0.9 \times -0.273)) \times 0.2)]$

$g_m = -1.171$

$g_c = \frac{\partial E}{\partial c} = -5.859$

step5: $v_m = \gamma v_m - \eta g_m$

$= [0.9 * (-0.273)] - (-0.1 * -1.81)$

$v_m = -0.3627$

$V_c = \gamma V_c - \eta g_c$

$= (0.9)(-0.873) - (-0.1 \times -5.859)$

$V_c = -1.370$

step6 : $m = m + V_m = 0.64 + (-0.362) = 0.279$

$c = c + V_c = -2.293 - 1.370 = -3.66$

step7 : sample = sample + 1 = 2

step8 : if (sample > ns)

$2 > 2 \times$

goto step4

step4 $g_m = \frac{\partial E}{\partial m} = -[(3.8 - (0.27 + (0.9 * -0.362))) \times 0.4$

$- (-3.66 + (0.9 * (-1.37))](0.4)$

$g_m = -2.985$

$g_c = \frac{\partial E}{\partial c} = -7.465$

step5 $V_m = [0.9 * -0.362] - [-0.1 \times -2.985] = -0.624$

$V_c = V_c \gamma - \eta g_c$

$V_c = [0.9 \times (-1.37)] - [0.1(-7.46)] = -1.980$

step6 $m += V_m = 0.297 + (-0.624) = -0.327$

$c += V_c = -3.66 - 1.98 = -4.644$

step7: sample = sample+1 = 3

step8: if(sample > ns)
goto step 9
else goto step 4

step9 iter+=1 => 2+1=3

3 > 2 ✓

step10 if(iter > epochs)
goto step 4 (next step)
else
goto step3

step11 print m, c

m = 0.327 } for 2 iterations (2 samples)
c = -4.64