Assignment - 11

Nesterov Accelerated Gradient (NAG)

sample (i)	x_i	y_i
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

→ Manual Calculations

Step1 : $[x, y]$, $m = 1$, $c = -1$, $\eta = 0.1$, epochs = 2

$\gamma = 0.9$, $v_m = v_c = 0$ $n_s = 2$

Step2 : iter = 1

Step3 : sample = 1

Step4 :- $g_m = -(y_i - (m + \gamma v_m) x_i) - (c + \gamma v_c)) x$

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

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

$= -(4.2)(0.2) = -0.84$

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

Step5 : $v_m = \gamma v_m - \eta g_m$

$= (0.9)(0) - (0.1)(-0.84)$

$= +0.084$

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

Step6: $m = m + v_m = 1 + 0.084 = 1.084$

$c = c + v_c = -1 + 0.42 = -0.58$

step 7: $s = 2 > n_s$ false go to Step4

Step4: $g_m = -\left(3.8 - \frac{(1.084 + (0.9)(0.084))}{0.4}\right) - \left(-0.58 + (0.9)(0.42)\right)$

$g_m = -\left(3.8 - \frac{0.46 \overset{+0.2}{\cancel{+\ldots}}}{0.4}\right)$

$= \cancel{-3.46} -1.41$

$g_c = -3.54$

Steps: $V_m = (0.9)(0.084) - (0.1)(-1.41)$

$= 0.075 + 0.141$

$= 0.216$

$V_c = (0.9)(0.42) - (0.1)(-3.54)$

$= 0.37 + 0.354$

$= 0.724$ ✓

Steps = $m = 1.084 + 0.216 = 1.3$

$c = -0.58 + 0.724 = 0.14$

Step7: $s = 3 > n_s$ true go to next step

step 8 : it = 2

step 9 : if (2 > 2) go to step 3.

step 3 : sample = 1

step 4 : $g_m = -\left(3.4 - \left(1.3 + (0.9)(0.216)\right)^{0.2}\right.$

$\left. - \left(0.14 + (0.9)(0.724)\right)\right)^{0.2}$

$g_m = -\left(3.4 - 0.29 - 0.79\right)^{0.2}$

$= -(2.32)^{0.2}$

$= -0.46$

$g_c = -2.32$

step 5 : $V_m = (0.9)(0.216) - (0.1)(-0.46)$

$= 0.194 + 0.046$

$= 0.24$

$V_c = (0.9)(0.724) - (0.1)(-2.32)$

$= 0.654 + 0.23$

$= 0.88$

Step6 : $m = 1.3 + 0.24$

$= 1.54$

$c = 0.14 + 0.88$

$= 1.02$

Step7 : $s = 2 > n_s$ false go to step4

Step4 : $g_m = -\left\{\left(3.8 - \left(\frac{1.54 + (0.9)(0.24)}{0.4}\right)\right) - \left(\frac{1.02 + (0.9)(0.88)}{0.4}\right)\right\}$

$g_m = -\left[(3.8 - 0.7 - 1.81)\,0.4\right)$

$= -(1.29)(0.4)$

$= -0.51$

$g_c = -1.29$

steps : $v_m = (0.9)(0.24) - (0.1)(-0.51)$

$= 0.216 + 0.051 = 0.26$

$v_c = (0.9)(0.88) - (0.1)(-1.29)$

$= 0.792 + 0.129$

$= 0.921$

Step6 :- $m = 1.54 + 0.26$

$= 1.80$

$C = 1.028 + 0.921$

$= 1.941$

Step7 :- $s = 3 > n_s$ True

go to next step.

Step8 :- it = 3

Step9 :- if (it > epochs) go to next step.

$3 > 2$

$\therefore$ $m = 1.80$

$c = 1.941$.