ASSIGNMENT - II

18K41A0536
CSE-A

Nesterov Accelerated Gradient (NAG) optimizer:-

sample	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 calculation:-

step1: initialization

$[x, y]$, $\eta = 0.1$, $\gamma = 0.9$, epoch = 2

$m = 1$, $c = -1$, $v_m = v_c = 0$,

step2: iter = 1

step3: sample = 1

step4: $g_m = -(y_i - (m + \gamma v_m) x_i - (c + \gamma v_c) x_i$

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

$= 0.84$

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

$v_m = \gamma v_m - \eta g_m = 0 - (0.1)(0.84)$

$= 0.084$

$v_c = \gamma v_c - \eta g_c = (0.9 \times 0) - (0.1)(-4.2)$

$v_c = 0.42$

Step 6: $m = m + v_m = 1 + 0.084 = 1.084$

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

Step 7: sample = 1+1 = 2

Step 8: if (2 > ns) if (2>2)

go to step 4

else go to next step

Step 4: $g_m = -(3.8 - (1.084 + (0.9)(0.084))(0.4)$

$g_m = -1.41$

$g_c = -3.54$

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step 5: $v_m = (0.9)(0.084) - (0.1)(-1.41)$

$v_m = 0.075 + 0.141$

$\boxed{v_m = 0.216}$

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

$= 0.37 + 0.354$

$\boxed{v_c = 0.724}$

step 6: $m = 1.084 + 0.216 = 1.3$

$c = -0.8 + 0.724 = -0.724$ 0.14

step 7: ~~w~~ = 1.084 + 1.

sample = 3 > 2

true go to next step

step 8: itr = 2

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

step 3: sample = 1

step 4: $g_m = -(3.4 - (1.3 + (0.9)(0.216)$

0.2

$g_m = -(2.32)(0.2)$

$g_m = -0.46$, $g_c = -2.32$

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

$= 0.194 + 0.046$

$= 0.24$

$V_c = (0.9)(0.724) - (0.1)(-2.3)$

$= 0.65 + 0.23$

$\boxed{V_c = 0.88}$

step 6: $m = 1.3 + 0.24 = 1.54$

$c = 0.14 + 0.88$

$c = 1.02$

step 7: sample = 2 > 2

go to step 4

step 4: $g_m = -(3.8 - (1.54) + (0.9)(0.24)$

$0.4 - (1.02 + (0.9)(0.88)0.4$

$g_m = -((3.8 - 0.7 - 1.81)0.4$

$g_m = -0.51$

$g_c = -1.29$

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Step 5: $V_m = (0.9)(0.24) - (0.9)(-0.51)$

$= 0.216 + 0.051$

$V_m = 0.26$

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

$= 0.792 + 0.129$

$\boxed{V_c = 0.921}$

Step 6: $m = 1.54 + 0.26$

$\boxed{m = 1.80}$

$C = 1.028 + 0.921$

$\boxed{C = 1.941}$

Step 7: $s = sample + 1 = 3 > 2$ True

go to next step

step 8: $it = 3$

step 9: if $(3 > 2)$ goto next step.

step 10: Print m & C values

$m = 1.8$

$c = 1.941$

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