Assignment-9

18K41A0528

Manual Calculations for two iterations with first two samples (Momentum optimizer)

Sample	x	y
1	0.2	3.4
2	0.4	3.8

$$V_t = \gamma V_{t-1} - \eta \frac{\partial F(x)}{\partial x}$$

$$x = x + V_t$$

$$Y \rightarrow 0.5 - 0.9$$

Step-1 - $\eta = 0.1$, $m = 1$, $c = -1$, epochs = 2, $\gamma = 0.9$, $V_m = 0$, $V_c = 0$

Step-2: iter = 1

Step-3: sample = 1

Step-4: $\frac{\partial E}{\partial m} = -(3.4 - (1)(0.2) + 1)0.2 = -0.84$

$\frac{\partial E}{\partial c} = -(3.4 - (1)(0.2) + 1) = -4.2$

Step-5: $V_m = \gamma V_m - \eta \frac{\partial E}{\partial m} = 0.9 \times 0 - (0.1)(-0.84)$

$V_m = 0.084$

$V_c = \gamma V_c - \eta \frac{\partial E}{\partial c} = 0.9 \times 0 - (0.1)(-0.42)$

$V_c = 0.42$

Step-6: $m = m + V_m = 1 + 0.084 = 1.084$

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

Step-7: sample = 2

Step-8: if (sample > 2) (2 > 2)

Step 9

else

step-4

Step-4: $\frac{\partial E}{\partial m} = -0.4(3.8-(1.084)(0.4)+0.58) = -1.578$

$\frac{\partial E}{\partial c} = -(3.8-(1.084)(0.4)+0.58) = -3.94$

Step-5: $V_m = \gamma V_m - \eta \frac{\partial E}{\partial m}$

$V_m = 0.9 \times 0.084 - (0.1)(-1.578) = 0.233$

$V_c = \gamma V_c - \eta \frac{\partial E}{\partial c} = 0.9 \times 0.42 - (0.1 * (-3.94))$

$V_c = 0.772$

Step-6: $m = m + V_m = 1.084 + 0.233 = 1.317$

$c = c + V_c = -0.53 + 0.772 = 0.192$

Step-7: Sample = 3

Step-8: if (3 > 2)

step 9

Step-9: ito = 2

Step-10 if (ito > epochs) (2 > 2) (x)

go to step-3

step-3: sample = 1

Step-4: $\frac{\partial E}{\partial m} = -(3.4-1.317*0.2-0.192)0.2 = -0.588$

$\frac{\partial E}{\partial c} = -(3.4-1.317*0.2-0.192) = -2.944$

Step-5: $V_m = \gamma V_m - \eta \frac{dE}{dm}$

$V_m = 0.9 * 0.233 + (0.1)(0.588) = 0.2685$

$V_c = \gamma V_c - \eta \frac{dE}{dc}$

$= 0.9 * 0.772 + (0.1)(2.944) = 0.9892$

Step-6: $m = m + V_m = 1.317 + 0.268 = 1.58$

$C = C + V_c = 0.192 + 0.989 = 1.18$

Step-7: Sample = 2

Step-8: if (2>2)

step 9

else

step-4

Step-4: $\frac{dE}{dm} = -(3.8 - 1.58 * 0.4 - 1.18)0.4 = -0.79$

$\frac{dE}{dc} = -(3.8 - 1.58 * 0.4 - 1.18) = -1.98$

Step-5: $V_m = \gamma V_m - \eta \frac{dE}{dm}$

$= 0.9 * 0.26 + (0.1)(0.79) = 0.313$

$V_c = \gamma V_c - \eta \frac{dE}{dc} = 0.9 * 0.98 + 0.1 * 0.98 = 1.08$

Step-6: $m = m + V_m = 1.58 + 0.313 = 1.89$

$C = C + V_c = 1.58 + 1.08 = 2.26$

Step-7: Sample = 3

Step-8: if (3>2) step 9

Step-9: i = 3

Step-10: if (3>2)

step 11

Step 11: m = 1.89, C = 2.26.