Assignment-15

18K41A0508

Let us consider a sample dataset have one input (x_i^a) and one output (y_i^a) and number of samples 2. Devdop a simple linear regression model using RMS prop optimizer.

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

Do manual calculations for 2 iterations with first two samples.

Step 1: $[x, y]$, $\eta = 0.1$, epoches = 2, $m = 1$, $c = -1$, $\beta = 0.9$,

$Em = E_c = 0$, $\varepsilon = 10^{-8}$

Step 2: itr = 1

Step 3: Sample = 1

Step 4: $g_m = -(3.4 - (1)(0.2) + 1)(0.2) = -0.84$

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

Step 5: $Em = (0.9)(0) + (1-0.9)(-0.84)^2 = 0.07$

$E_c = (0.9)(0) + (1-0.9)(-4.2)^2 = 1.764$

Step 6: $\Delta m = \frac{-0.1}{\sqrt{0.07 + 10^{-8}}} * (-0.84) = 0.31$

$\Delta c = \frac{-0.1}{\sqrt{1.764 + 10^{-8}}} * (-4.2) = 0.31$

18K41A0508

Step 7 : $m = m + \Delta m = 1 + 0.31 = 1.31$

$c = c + \Delta c = -1 + 0.31 = -0.69$

step 8 : Sample = sample + 1

$= 1 + 1 = 2$

Step 9 : if (sample > ns) goto step 10

$2 > 2$

else

goto step 4

Step 4 : $g_m = -(3.8 - (1.31)(0.4) + 0.69)\ 0.4 = -1.5$

$g_c = -(3.8 - (1.31)(0.4) + 0.69) = -3.9$

Step 5 : $E_m = (0.9)(0.07) + (0.1)(-1.5)^2 = 0.28$

$E_c = (0.9)(1.76) + (0.1)(-3.9)^2 = 3.1$

Step 6 : $\Delta m = \frac{-0.1}{\sqrt{0.28 + 10^{-8}}} * (-1.5) = 0.28$

$\Delta c = \frac{-0.1}{\sqrt{3.1 + 10^{-8}}} * (-3.9) = 0.22$

step 7 : $m = m + \Delta m = 1.31 + 0.28 = 1.59$

$c = c + \Delta c = -0.69 + 0.22 = -0.47$

step 8 : Sample = Sample + 1

$= 2 + 1 = 3$

step 9 : if (sample > ns) goto step 10

$3 > 2$

else

goto step - 4

step 10 : itr = itr + 1

$= 1 + 1 = 2$

step 11 : if (itr > epoches)

goto step 12

else

goto step 3

18K41A0508

step 3: Sample = 1

step 4: $g_m = -(3.4 - (1.59)(0.2) + 0.47)(0.2) = -0.7$

$g_c = -(3.4 - (1.59)(0.2) + 0.47) = -3.5$

step 5: $E_m = (0.9)(0.28) + (0.1)(-0.7)^2 = 0.3$

$E_c = (0.9)(3.1) + (0.1)(-3.5)^2 = 4.0$

step 6: $\Delta m = \frac{-0.1}{\sqrt{0.3 + 10^{-8}}} * (0.7) = 0.12$

$\Delta c = \frac{-0.1}{\sqrt{4.0 + 10^{-8}}} * (-3.5) = 0.17$

step 7: $m = m + \Delta m = 1.59 + 0.12 = 1.71$

$c = c + \Delta c = -0.47 + 0.17 = -0.3$

step 8: sample = sample + 1

$= 1 + 1 = 2$

step 9: if (sample > ns)

$2 > 2$ goto step 10

else

goto step 4

step 4: $g_m = -(3.8 - (1.71)(0.4) + 0.3) * 0.4 = -1.4$

$g_c = -(3.8 - (1.71)(0.4) + 0.3) = -3.6$

step 5: $E_m = (0.9)(0.3) + (0.1)(-1.4)^2 = 0.46$

$E_c = (0.9)(4.0) + (0.1)(-3.6)^2 = 4.89$

step 6: $\Delta m = \frac{-0.1}{\sqrt{0.46 + 10^{-8}}} * (-1.4) = 0.2$

$\Delta c = \frac{-0.1}{\sqrt{4.89 + 10^{-8}}} * (-3.6) = 0.16$

18K41A0508

step 7 : $m = m + \Delta m = 1.71 + 0.2 = 1.91$

$c = c + \Delta c = -0.3 + 0.16 = -0.14$

step 8 : sample = sample + 1

= 2 + 1 = 3

step 9 : if (sample > ns)

3 > 2 goto step 10

else

goto step 4

step 10 : itr = itr + 1

= 2 + 1 = 3

step 11 : if (itr > epoches)

3 > 2 goto step 12

else

goto step -3

step 12 : m = 1.91

c = -0.14