ASSIGNMENT-15

18K41A0502

Let us consider a sample dataset have one input (x_i^a) and one output (y_i^a) and no. of samples 2. Develop 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.

S-1: [x, y], $\eta = 0.1$, epoches = 2, $m = 1$, $c = -1$, $\beta = 0.9$, $E_m = E_c = 0$, $\varepsilon = 10^{-8}$.

S-2: $tr = 1$

S-3: sample = 1

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

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

S-5: $E_m = (0.9)(0) + (1-0.9)(-0.84)^2 = 0.07$

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

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

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

S-7: $m = m + \Delta m = 1 + 0.31 = 1.31$

S-8: sample = sample + 1
$= 1 + 1 = 2$

S-9: If (sample > ns) goto S-10
$2 > 2$
else
goto S-4

S-4: $g_m = -(3.8 - (1.31)(0.4) + 0.69)\,0.4 = -1.05$
$g_c = -(3.8 - (1.31)(0.4) + 0.69) = -3.9$

S-5: $E_m = (0.9)(0.07) + (0.1)(-1.05)^2 = 0.28$
$E_c = (0.9)(1.76) + (0.1)(-3.9)^2 = 3.01$

S-6: $\Delta m = \frac{-0.1}{\sqrt{0.28 + 10^{-8}}} * -1.05 = 0.28$

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

S-7: $m = m + \Delta m = 1.31 + 0.28 = 1.59$
$c = c + \Delta c = -0.69 + 0.22 = 0.47$

S-8: sample = sample + 1
$= 2 + 1 = 3$

S-9: If (sample > ns) goto S-10
$3 > 2$
else S-4

S-10: ~~ptr~~ ptr = ptr + 1
$= 1 + 1 = 2$

S-11: If (ptr > epoches)
goto S-12
else
goto S-3

S-3: sample = 1

S-4: $gm = -(3.4-(1.59)(0.2)+0.47)(0.2) = -0.7$

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

S-5: $Em = (0.9)(0.28)+(0.1)(-0.7)^2 = 0.3$

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

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

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

S-7: $m = m + \Delta m = 1.59 + 0.12 = 1.71$

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

S-8: sample = sample + 1.

$= 1 + 1 = 2.$

S-9: If (sample > ns)

$2 > 2$

goto S-10

else

goto S-4

S-4: $gm = -(3.8-(1.71)(0.4)+0.3) * 0.4 = -1.4$

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

S-5: $Em = (0.9)(0.3)+(0.1)(-1.4)^2 = 0.46$

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

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

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

s-7: $m = m + \Delta m = 1.71 + 0.2 = 1.91$

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

s-8: sample = sample + 1

$= 2 + 1 = 3$

s-9: if (sample > ns)

$3 > 2$ goto s-10

else

goto s-4

s-10: itr = itr + 1

$= 2 + 1 = 3$

s-11: if (itr > epoches)

$3 > 2$ goto s-12

else

goto s-3

s-12: $m = 1.91$

$c = -0.14$.