Assignment - 15 18K41A0556

* Let us consider a sample dataset have one input (x_i) and one output (y_i) and no. of samples 2. Develop a sample linear regression model using rms prop optimiser.

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

Do manual calculations for 2 iterations.

Step ①: $[x, y]$, $\eta = 0.1$, epoches = 2, $m = 1$, $c = -1$, $\gamma = -9$, $em = ec = 0$, $\varepsilon = 10^{-8}$.

Step ②: $nv = 1$.

Step ③: sample = 1.

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

$= -0.84$.

$gc = -(3.4 - (1)(0.2) + 1) = -4.3$

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

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

$= -1.764$.

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

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

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 > 0

else goto step-4

Step-4: $gm = -(3.8 - (1.31)(0.4) + 0.69)0.4$

$= 1.5$

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

Step-5: ~~Error~~ $Em = (0.9)(0.07) + (0.1)(-1.5)^2$

$= 0.28$

$Ec = (0.9)(1.76) + (0.1)(-3.9)^2 = 3.0$

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-8: $c = c + \Delta c = -0.69 + 0.22 = 0.47$

step-9: sample = sample + 1 = 2 + 1 = 3

step-10: if (sample > 4) 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)

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: $\epsilon_m = (0.9)(0.28) + (0.1)(0.7)^2 = 0.3$

$\epsilon_c = (0.9)(3.1) + (0.1)(-3.5)^2 = 4.0$.

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

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

Step-8: sample = sample + 1

$= 1 + 1 = 2$

Step-9: if (sample > n)

$2 > 2$

goto step-10

else goto step-4

Step-5: $\epsilon_m = (0.9)(0.3) + (0.1)(-1.4) \approx -0.46$

$\epsilon_c = (0.9)(4.0) + (0.1)(5.6) \approx -4.89$

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

$\Delta c = \frac{-0.1}{\sqrt{4.89 + 10^{-8}}} * -3.6 = 0.10$

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 > n)

$3 > 2$

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 = 1.9

e = 0.14.