Assignment-13 18K41A0524

let us consider a sample dataset have one input (x_i^a) and one input (y_i^a) & no of sample Develop a simple linear regression model using ADAGRAD 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: $[x, y]$, epoches $= 2$, $m=1$, $c=-1$, $G_m=0$, $G_c=0$

$\eta = 0.1$, $\epsilon = 10^{-8}$

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: $G_m = 0 + (-0.84)^2 = 0.7056$

$G_c = 0 + (-4.2)^2 = 17.64$

Step-6: $\Delta m = \dfrac{-\eta}{\sqrt{G_m+\epsilon}}\, g_m$

$= \dfrac{-(0.1)}{\sqrt{0.7056+10^{-8}}} * -0.84$

$= 0.09$

$$\Delta c = \frac{-(0.1)}{\sqrt{17.6+10^{-8}}} * 4.2 = 0.09$$

step-7 : $m = m + \Delta m = 1 + 0.09 = 1.09$

$c = c + \Delta c = -1 + 0.09 = 0.91.$

step-8 : sample : sample + 1

$= 1+1$

$= 2$

step-9 : If (sample $> n_s$) go to step-10

$2 > 2$

else

step-4

step-4 : $g_m = -(3.8 - (1.09)(0.4) + 0.91)0.4 = -1.7$

$g_c = -(3.8 - (1.09)(0.4) + 0.91) = -4.27$

step-5 : $G_m = 0.7056 + (-1.7)^2 = 3.59$

$G_c = 17.64 + (-4.22)^2 = 35.87$

step-6 : $\Delta m = \frac{-0.1}{\sqrt{3.59+10^{-8}}} * -1.7 = 0.08$

$$\Delta c = \frac{-0.1}{\sqrt{35.87+10^{-8}}} * -4.27 = 0.07$$

step-7 : $m = m + \Delta m = 1.09 + 0.08 = 1.17$

$c = c + \Delta c = -0.91 + 0.07 = -0.84$

step-8 : sample = sample + 1

step-9 : If (sample $> n_s$) go to step-10

$3 > 2$

else

go to step-4

step-10 : iter = itr + 1

$= 1 + 1$

$= 2$

step-11 : if (itr > epoches) go to step-12

$2 > 2$

else

go to step-3

step-3 = sample = 1

step-4 : $g_m = -(3.4 - (1.17)(0.2) + 0.84)\, 0.2 = -0.80$

$g_c = -((3.4) - (1.17)(0.2) + 0.84) = -4.0$

step-5 : $G_m = 3.59 + (-0.80)^2 = 4.23$

$G_c = 35.89 + (-4.0)^2 = 51.89$

step-6 : $\Delta m = \frac{-0.1}{\sqrt{4.23 + 10^{-8}}} * (-0.80) = 0.038$

$\Delta c = \frac{-0.1}{\sqrt{51.89 + 10^{-8}}} * -4.0 = 0.05$

step-7 : $m = m + \Delta m = 0.038 + 1.117 = 1.208$

$c = c + \Delta c = -0.84 + 0.05 = -0.79$

step-8 : sample = sample + 1

$= 1 + 1 = 2$

step-9 : if (sample > n_s) go to step-10

$2 > 2$

else

go to step-4

Step-4 : $g_m = -(3.8-(1.20)(0.4)+0.79)*0.4 = 1.64$

$g_c = -(3.8-(1.20)(0.4)+0.79) = -4.11$

Step5 : $G_m = 4.23 + (-1.64)^2 = 6.9$

$G_c = 51.89 + (-4.11)^2 = 68.7$

Step-6 : $\Delta m = \frac{-0.1}{\sqrt{6.9+10^{-8}}} * -1.64 = 0.06$

$\Delta c = \frac{-0.1}{\sqrt{68.7*10^{-8}}} * -4.11 = 0.04$

Step-7 : $m = m + \Delta m = 1.208 + 0.06 = 1.26$

$c = c + \Delta c = -0.79 + 0.04 = -0.75$

Step-8 : sample = sample+1

$2+1=3$

Step-9 : If sample (sample $> n_s$)

$3>2$

goto step-10

else

go to step-4

Step-10 : iter = itr+1

$= 2+1 = 3$

Step-11 : If (itr > epoches)

$3>2$

goto step-12

else goto step-3

Step-12 : $m = 1.26$

$c = -0.75$

Assignment - 15

18K91A0524

let us consider a sample dataset have one (x_i^a) & one output (y_i^a) a no. of samples

Develop a simple Linear regression model 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 $= 2$, $m = 1$, $c = -1$, $\gamma = 0$, $E_m = E_c = 0$, $\epsilon = 10^{-8}$

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

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

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

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

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 $> n_s$) go to step-10

$2 > 2$

else

go to 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 : $\Delta m = \dfrac{\cancel{-}\,0.1}{\sqrt{0.28 + 10^{-8}}} * -1.5 = 0.28$

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

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

step-9 : If (sample $> n_s$)

go to step-10

else

step-4

step-10 : $itr = itr + 1$

step-11 : if ($itr \geq epoches$)

go to step-12

else

go to step-3

step-3 : $samp = 1$

step-10 : $itr = itr + 1$

$2 + 1 = 3$

step-11 : if ($itr \geq epoches$)

$3 > 2$

go to step-12

else

go to step-3

step-12 : $m = 1.91$

$c = -0.14$