Assignment - 13

18K41A0556

Let us consider a sample dataset have one input ($x_i a$) and one input ($y_i a$) and no. of sample. Develop a simple linear regression model using ADAGRAD optimiser.

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

step ①: (x, y), $m = 1$, $c = -1$, $Gm = 0$, $Gc = 0$, $\eta = 0.1$, $\varepsilon = 10^{-8}$.

step ②: if $r = 1$

step ③: sample = 1

step ④: $gm = -(3.4 - (1)(0.2) + 1)0.2 = -0.84$

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

$= -4.2$

step ⑤: $Gm = 0 + (-0.84)^2$

$= 0.7056$

$Gc = 0 + (-4.2)^2 = 17.67$.

step ⑥: $\Delta m = \frac{-\eta}{G_m + S} g_m$

$= \frac{(0.1)}{\sqrt{0.7056 + 10^{-3}}} * -0.84$

$= 0.09$

step ⑦: $m = m + \Delta m$

$= 110.09 = 1.09$

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

step ⑧: sample = sample + 1 = 2

step ⑨: if (sample > n_s) goto ~~sp~~. step − 10

2 > 2

step 4: $g_m = -(38 - (1.09)(0.4) + (0.9)0.4) = -1.7$

$g_c = -(36 - (109)(0.4) + 0.9) = -4.22$

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

$G_c = 1764 + (4.22)^2 = 35.82$

step 6: $\Delta m = \frac{-0.1}{\sqrt{3.51 + 10^{-8}}} * -17 = 0.05$

$\Delta c = \frac{-0.1}{\sqrt{35.87 + 10^{-8}}} * -4.87 = 0.07$

Step-7: $m = m + \Delta m = 1.09 + 0.08$

$= 1.17$

Step-8: sample = sample + 1

$= 2 + 1 = 3$

Step-9: if(sample > no)

(3 > 2)

else goto step 4

Step 10: itr = itr + 1 = 1 + 1 = 2

Step 11: if(itr > epoches) goto step 12

2 > 2

else goto step-3

Step 3: sample = 1

Step 4: $g_m = (34 - (1.17)(0.2) + 0.84).2$

$= 0.80$.

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

$= -40$.

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: $m = m + \Delta m = 0.038 + 1.17 = 1.208$

$c = c + \Delta c = 0.89 + 0.05 = -0.79$

Step-8: sample = sample + 1 = 1 + 1 = 2

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

2 > 2

else goto step 4.

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

$= -1.64$

$gc = -(3.8 - (1.20)(0.4) + 0.79) = 4.41$.

Step-5: $Gm = 11.13 + (-1.64)^2 = 6.9$

$Gc = 51.69 + (-4.11)^2 = 68.2$

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

$\Delta c = \frac{-0.1}{\sqrt{68.2-10^8}} * -4.11 = 0.04$.

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

$c = c + \Delta c = -0.79 + 0.042 = 0.25$.

Step-8: sample = sample + 1

$= 2 + 1$

$= 3$

step-9: if(sample > 4)

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 = 1.26

c = 0.35