ASSIGNMENT - 13

18KU1A05B4

Let us consider a sample dataset have one input (x_i) and one input (y_i) and number of sample 4. Develop a simple linear regression model using ADAGRAD optimiser.

sample	x_i	y_i
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

Step-1; $[x, y]$, epochs = 2, $m = 1$, $c = -1$, $G_m = 0, G_c = 0$

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

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

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

Step-6; $\Delta m = \frac{-\eta}{\sqrt{G_m + \varepsilon}} g_m$

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

$$\Delta c = \frac{-(0.1)}{\sqrt{17.6+10^{-8}}}(-0.37)$$

$$= 0.09$$

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

$$2 + 1 = 2$$

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

else

step-4

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

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

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

$$G_c = 17.64 + (-4.27)^2 = 35.87$$

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

$$\Delta c = \frac{-0.1}{\sqrt{358+10^{-8}}}(-4.27) = 0.07$$

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

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

tep-8: Sample = sample + 1 = 2 + 1 = 3

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

3 > 2

else go to step-4

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

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

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

$G_c = 85.89 + (-4.0)^2 = 51.89$

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

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

Step-8: sample = samp + 1 = 2 + 1 = 3

Step-9: if (sample > n_s)

go to step-10

else

go to step-4

Step-10: itr = itr + 1 = 2 + 1 = 3

Step-11: if (itr > epoches)

go to step-12

else

go to step-3

Step-12: m = 1.26, c = -0.75