Assignment 15 18K41A05E4

Let consider a sample dataset have one input (x_i) and one output (y_i) and number of samples 4. Develop a simple linear regression model using RMSprop optimizer

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 with 1st 2 samples

Step1 :- [x, y], $\eta = 0.1$, epoches = 2, m = 1, c = -1,

$\gamma = 0.9$, $E_m = E_c = 0$, $\varepsilon = 10^{-8}$

Step2 :- iter = 1

Step3 :- sample = 1

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

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

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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

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

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

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

$_2$ >2

else goto 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 :- $E_m = (0.9)(0.07) + (0.1)(-1.5)^2 = 0.28$

$E_c = (0.9)(1.76) + (0.1)(-3.9)^2 = 3.1$

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Step6 :-

$$\Delta m = \frac{-0.1}{\sqrt{0.28 + 10^{-8}}} * -1.5 = 0.28$$

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

Step7

$$m = m + \Delta m = 1.31 + 0.28 = 1.59$$

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

Step8 :- if sample = sample + 1
= 2 + 1
= 3

Step9 :- if (sample > ns) goto step10
3 > 2

else step 4

Step10 :- iter = iter + 1
= 1 + 1 = 2

Step4 :- if (iter > epoches) goto step12

else step 3

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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 :- $E_m = (0.9)(0.28) + (0.1)(-0.7)^2 = 0.3$

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

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

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

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

Step 9 : if (sample > ns) goto step 10
2 > 2

else goto step 4

Step 4 :- $g_m = -(3.8 - (1.71)(0.4) + 0.3) * 0.4 = -1.4$

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

Step 5 :- $E_m = (0.9)(0.3) + (0.1)(-1.4)^2 = 0.46$

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

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

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

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 > ns) goto step 10
3 > 2

else goto step 4

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

Step 11 :- if (iter > epoches) goto step 12
3 > 2

else goto step3

Step 12 :- m = 1.91

c = -0.14

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