ASSIGNMENT-3

18K41A0538.

Let us consider a sample dataset Calle one input (xiA) and one output (yiA), and number of samples 4. Develop a simple linear reggression model using stochastics gradient descent optimizer

Sample	xiA	yiA
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

Do manual calculations for two iterations, with first two samples.

- write the python code to build simple linear reggression model using SGD optimizer (consider all 4 samples)

Step 1: x, y, m=1, c=-1, η=0.1, epoches=2, ns=2

Step 2: itr = 1

Step 3: sample = 1

Step 4: $\frac{d\epsilon}{dm} = -(8.4(1)(0.2) - (-1)0.2$

$= -0.84$

$\frac{d\epsilon}{dc} = -(3.4(1)(0.2+1)$

$= -4.2$

Step 5: $\Delta m = -(0.1)(-0.84) = 0.084$

$\Delta c = -(0.1)(-4.2)$

$= 0.42$

Step 6: $m = m + \Delta m$

$= 1 + 0.084 = 1.084$

$c = c + \Delta c$

$= -1 + 0.42 = -0.58$

Step 7: sample + = 1

1 + 1 = 2

Step 8: if (sample > n 5)

S $x > 2$

goto step - 9

else

goto step - 4

Step 4: $\frac{\partial E}{\partial m} = -(38 - (1.084)(0.4) + 0.58)0.4$

$= -1.5785$

$\frac{\partial E}{\partial c} = -(3.8 - (1.084)(0.4) + 0.58)$

$= -3.9464$

Step 5: $\Delta m = -(0.1)(-1.5785) = 0.1578$

$\Delta c = -(0.1)(-3.9464) = 0.3946$

Step 7: sample + = 1

2 + 1 = 3

Step 6: $m = m + \Delta m = 1.084 + 0.1578$

$= 1.2418$

$c = c + \Delta c = -0.58 + 0.3946$

$= -0.1854$

Step 8 : if (sample > ns)

$3 > 2$

goto step - 9

else

goto step - 4

Step 9: itr += 1

$1 + 1 = 2$

Step 10: if (itr > epoches)

$2 > 2$

goto step - 11

else

gotostep 3

Step 3: sample = 1

Step 4: $\frac{\partial E}{\partial m} = -(3.4 - (1.2)(0.2) + 0.18)\, 0.2$

$= -(3.34)\, 0.2$

$= -0.668$

$\frac{\partial E}{\partial c} = -(3.4 - (1.2)(0.2) + 0.18)$

$= -3.34$.

Step 5: $\Delta m = -(0.1)(-0.668)$

$= 0.0668$

Step 6: $m = m + \Delta m = 1.24 + 0.066 = 1.3$.

$c = c + \Delta c = 0.18 + 0.33 = 0.15$

Step7: sample = 1

1+1 = 2

Step8: if (sample > ns)

2 > 2

goto step 9

else

goto step 4

Step 4: $\frac{\partial \epsilon}{\partial m} = -(3.8 - (1.3)(0.4) - 0.15)$

$= .313$

Step5: $\Delta m = -(0.1)(1.25) = 0.12$

$\Delta c = -(0.1)(-3.13) = 0.32$

Step 6: $m = m + \Delta m = 1.3 + 0.12 = 1.42$

$c = c + \Delta c = 0.15 + 0.31 = 0.46$

Step7: sample = sample + 1

2+1 = 3

Step8: if (sample > ns)

3 > 2

goto step - 9

else

goto step-4

Step 9: itr = itr + 1

= 2 + 1 = 3

Step 10: if (itr > epoches) 3 > 2

goto step 11

else goto step 3

step-11: print m & c

m = 1.42 , c = 0.46

$c_1 = vc$

$-3.615 - 1.928 = -5.543$

Step-7: sample $+ = 1$

$a+1 = 3$

Step8: if (Sample > ns)

goto step-9

else

goto step-4

Step 9: itr-1 = 1

$a+1 = 3$

Step 10: if (itr > epochs)

goto step-11

else

goto step-3

Step 11: print m, c

$m = -0.316$, $c = -5.543$