Assignment-3

- 18KU1A0491

Let us consider a sample dataset have one input (x_i^a) and one output (y_i^a), and number of samples 4. Develop a simple linear regression model using stochastic gradient descent 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

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 : $\frac{dE}{dm} = -(8-4(1))(0.2) - (-1)(0.2)$

$= -0.84$

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

$= -4.2.$

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-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 : $m = m + \Delta m = 1.24 + 0.066 = 1.3$

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

step-7 : sample += 1

$1+1 = 2$

step-8 : if (sample > ns)

$2 > 2$

goto step-9

else

goto step-4

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

$= -1.25$

$\frac{\partial E}{\partial c} = -(3.8 - (1.3)(0.4) - 0.15)$

$= -3.13$

step-5 : $\Delta m = -(0.1)(-1.25) = 0.12$

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

step-6 : $m = m + \Delta m = 1.3 + 0.12 = 1.42$

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

step-7 : sample = sample + 1

= 2+1 = 3

step-8 : 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.