Assignment - 3

let us consider sample dataset have one input (x;a) and one output (y;a) and number of samples. develop a sample Regress -ion model using stochastic gradient descent 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
5		

→ Do manual calculations for 2 itesations, 2 samples.

step1: x, y, m=1, c=-1, η=0.1, epoches = 2, ns = 2

step2: itr = 1

step3: sample = 1

step4: $\frac{dE}{dm} = -(8.4-(1))(0.2) - (-1))0.2$

$= -0.84$

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

$= -4.2$

step5: $\Delta m = -(0.1)(-0.84) = 0.084$

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

$= 0.42.$

step6: $m = m + \Delta m$

$= 1 + 0.084 = 1.084$

$c = c + \Delta c$

$= -1 + 0.42 = -0.58$

step7: sample += 1

= 1 + 1

= 2

step8: if (sample > ns)

2 > 2.

goto step9

else

goto step4

step4: $\frac{\partial E}{\partial m} = -(38 - (1.084)(0.4) + 0.58)0.4$

$= -1.5785$

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

$= -3.9464$

step5: $\Delta m = -(0.1)(-1.5785) = 0.1578$

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

step7: sample += 1 = 2 + 1 = 3

step6: $m = m + \Delta m = 1.084 + 0.1578 = 1.2418$

$c = c + \Delta c = -0.58 + 0.3946 = -0.1854$

step8: if (sample > ns)

3 > 2

goto step9.

else

goto step4

step9: itr += 1

= 1 + 1 = 2

step10 : if (iter > epochs)

2 > 2

goto step11

else

goto step3.

step3 sample = 1

step4 $\frac{\partial E}{\partial m} = -(3.4 - (1.2)(0.2) + 0.18)\,0.2$

$= -(3.34)\,0.2$

$= -0.668$

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

$= -3.34$

step5 : $\Delta m = -(0.1)(-0.668)$

$= 0.0668$

step6 : $m = m + \Delta m = 1.24 + 0.066 = 1.3$

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

step7 : sample += 1

$= 1 + 1 = 2$

step8 : if (sample > ns)

2 > 2

goto step9.

else

goto step4

step9 : $\frac{\partial E}{\partial m} = -(3.8 - (1.3)(0.4) - 0.15)\,0.4$

$= -1.25$

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

$= -3.13$

step5: $\Delta m = -(0.1)(-1.25) = 0.12$

$\Delta c = -(0.1)(-3.13) = 0.31$

step6: $m = m + \Delta m = 1.3 + 0.12 = 1.42$

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

step7: sample = sample + 1

= 2 + 1 = 3

step8: if(sample > ns)

3 > 2

goto step9

else

goto step4

step9: iter = iter + 1

= 2 + 1 = 3

step10: if (iter > epoches)

3 > 2

goto step11

else

goto step3

step11: print m & c.

m = 1.42 c = 0.46