ASSIGNMENT-3

Let us consider sample dataset have one Input (x_i) and one output (y_i) and number of samples develop a sample Regression model using stochastic Gradient descent 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 & 2 samples

step 1: x, y, m=1, c=-1, η=0.1, epochs=2
ns=2

step 2: itr = 1

step 3: sample = 1

step 4: $\frac{\partial E}{\partial m} = -(y_i - m * x_i - c)(x_i)$

$= -(83.4 - 1 * (0.2) + 1)(0.2)$

$= -0.84$

$$\frac{\partial F}{\partial c} = -2(3.4)(-(3.4-(1)(0.2)+1))$$

$$= -4.2$$

step 5: $\Delta m = -\eta \frac{\partial F}{\partial m} = -(0.1)(-0.84)$

$$= 0.084$$

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

$$= 0.42$$

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

$$= 1 + 0.084 = 1.084$$

$$c = c + \Delta c$$

$$= -1 + 0.42 = -0.58$$

step 7: sample = sample + 1

$$= 1 + 1$$

$$= 2$$

step 8: if (sample > ns)

$$2 > 2$$

goto step 9

else

goto step 4

Step 4:-

step 1: $\frac{\partial E}{\partial m} = -(3.8 - (1.084)(0.4) + 0.58)(0.4)$

$= -1.5785$

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

$= -3.9464$

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

$= 0.1578$

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

$= 0.3946$

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

$= 1.084 + 0.1578 = 1.2418$

$c = c + \Delta c$

$= -0.58 + 0.3946$

$= -0.1854$

step 7: sample = sample + 1

step 8: if (sample > ns)

3 > 2

goto step 9

else

goto step 4

step 9: itr = itr+1

= 1+1

= 2

step 10: if (itr > epochs)

2 > 2.

goto step 11

else

goto step 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: $m = m + \Delta m = 1.24 + 0.066 = 1.306$

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

step 7: sample = 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: $\Delta m = -(0.1)(-1.25) = 0.12$

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

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

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

step 7: sample = sample + 1

= 2+1 = 3

step 8: if (sample > ns)

3 > 2

goto step 9

else

goto step 4

step 9 : iter = iter + 1

= 2+1 = 3

step 10 : if (iter > epoches)

3 > 2

go to step 11

else

goto step 3

step 11 : Print m & C

m = 1.42 C = 0.46