ASSIGNMENT - 7

18KUIA0575

Let consider a sample dataset having input (x_i) and output (y_i) and number of samples and develop a sample linear regression model using BGD.

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.

Step 1: [X, Y], m=1, c=1, η=0.1, epochs=2, ns=2

2: iter = 1

3: $\frac{\partial E}{\partial m} = \frac{-1}{ns} \sum_{i=}^{ns} (y_i - mx_i - c)x_i$

$= \frac{-1}{2}[(3.4 - (1)(0.2)+1)0.2 + (3.8 - (1)(0.4)+1)0.4]$

$= -1.34$

$\frac{\partial E}{\partial c} = \frac{-1}{2}[(3.4 - 0.2 + 1) + (3.8 - 0.4 + 1)]$

$= -4.3$

4: $\Delta m = -\eta \cdot \frac{\partial E}{\partial m}$

$= -0.1(-1.34) = 0.134$

$$\Delta c = -\eta \cdot \frac{\partial E}{\partial c}$$

$$= -0.1 \times -4.3$$

$$= 0.43$$

5: updating m and c values

$$m = m + \Delta m$$

$$= 1 + 0.134 = 1.134$$

$$c = c + \Delta c$$

$$= 0.1 + 0.43 = 0.53$$

$$= 3.3$$

6: iter = iter + 1

$$= 1 + 1 = 2$$

7: if (iter > epochs) : go to step 8

$$2 > 2$$

else : go to step 3

3: $\frac{\partial E}{\partial m} = -\frac{1}{2}[(3.4 - (1.134)(0.2) + 0.57)(0.2) +$

$(3.8 - (1.134)(0.4) + 0.57)(0.4)]$

$$= -1.157$$

$\frac{\partial E}{\partial c} = -\frac{1}{2}[(3.8 + (-1.134)(0.2) + 0.57) +$

$(3.8 - (1.134)(0.4) + 0.57)]$

$$= -3.829$$

step 4: calculating delta values

$$\Delta m = -\eta \cdot \frac{\partial E}{\partial m} = -0.1 \times -1.157$$
$$= 0.1157$$

$$\Delta c = -\eta \cdot \frac{\partial E}{\partial c} = -0.1 \times -3.829$$
$$= 0.3829$$

5: updating m & c values

$$m = m + \Delta m = 1.134 + 0.1157$$
$$= 1.2497$$

$$c = c + \Delta c = -0.57 + 0.3829$$
$$= -0.187$$

6: iter = iter + 1

$$= 2 + 1 = 3$$

7: if (iter > epochs)

$3 > 2$: go to step 8

8: $m = 1.2497$, $c = -0.187$.