Assignment -7

18K4HA0508

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 BGD

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

- Do manual calculations for 2 iterations with first two samples

step 1: [x, y], m = 1, c = -1, η = 0.1, epoches = 2, ns = 2

step 2: itr = 1

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

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

$= -1.34$

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

$= -4.3$

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

$= -0.1 \times -1.34$

$= 0.134$

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

$= -0.1 * -4.3 = 0.43$

Step 5: $m+ = \Delta m$

$1 + 0.134$

$= 1.134$

$c+ = \Delta c$

$= -0.1 \times 4.3$

$= 0.43$

Step 6: $itr + 1 = itr$

$1 + 1 = 2$

Step 7: if (itr > epoches)

goto step 8

$2 > 3$

else

goto step 3

step 3: $\frac{\partial E}{\partial m} = \frac{-1}{2}[(3.4 - (1.134)(0.2) + 0.57)(0.2) +$
$(3.87 - (1.134)(0.4) + 0.57)(0.4)]$

$= -1.157$

$\frac{\partial E}{\partial c} = \frac{-1}{2}[(3.4 - (1.134)(0.2) + 0.57) +$
$(3.8 - (1.134)(0.4) + 0.57)]$

$= -3.827$

step 4: $\Delta m = -0.1 \times -1.157 = 0.1157$

$\Delta c = -0.1 \times 3.829 = 0.3829$

step 5: $m+ = \Delta m$

$1.134 + 0.1157$

$= 1.2497$

$c+ = \Delta c$

$-0.57 + 0.3829$

$= -0.187$

step 6 : itr+ = 1

2+1 = 3

step 7 : if (itr > epoches)
goto step 8

3 > 2

else

goto step 3

step 8 : m = 1.2497

c = -0.1871