Assignment-7

18K41A0587

Q) Develop a simple 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

Sol: D:[X,Y], m=1, c=-1, η=0.1, epochs = 2, ns = 2

step2: itr = 1

step3: $\frac{\partial E}{\partial m} = \frac{-1}{ns}\sum_{i=1}^{ns}(y_i - mx_i - c)x_i$

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

$= -1.34$

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

$= -4.3$.

step4: $\Delta m = -\eta\frac{\partial E}{\partial m} = -0.1 \times -1.34 = 0.134$

$\Delta c = -\eta\frac{\partial E}{\partial c} = -0.1 \times -4.3 = 0.43$.

step5: $m = m + \Delta m = 1 + 0.134 = 1.134$

$c = c + \Delta c = -1 + 0.43 = -0.57$

step6: itr = itr + 1 = 1 + 1 = 2.

step7 : if (itr > epochs)
2>3
goto step8

else

goto step3

step3 : $\frac{\partial \epsilon}{\partial m} = -\frac{1}{2}\left[(3.4 - (1.134)(0.2) + 0.57)(0.2) + (3.8 - (1.134)(0.4) + 0.57)(0.4)\right]$

$= -1.157$

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

$= -3.829$

step4 : $\Delta m = -0.1 \times -1.157 = 0.1157$

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

step5 : $m = m + \Delta m = 1.134 + 0.1157$

$= 1.2497$

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

$= -0.187$

step6 : itr = itr + 1 = 2 + 1 = 3.

step7 : if (itr > epochs)
3>2
goto step8

else

goto step3.

step8 : print m and c values.

m = 1.2497 , c = -0.1871