Assignment-7.

18KUA05H1

Develop a simple linear Regression Model using BGD for the following data where $n_s = 4$

sample	x_i	y_i
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

step-1:- $[x, y]$, $m=1$, $c=-1$, $\eta = 0.1$, epochs $= 2$, $n_s = 2$

step-2:- epoch $= 1$

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

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

$= -1.3$

step-4:- $\frac{\partial E}{\partial c} = \frac{-1}{n_s} \sum_{i=1}^{n_s} (y_i - mx_i - c)$

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

$= -4.3$

step-4:- $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.1)(-1.3) = 0.13$

$\Delta c = -\eta \frac{\partial E}{\partial m} = -(0.1)(-4.3) = 0.43$

step5 : $m = m + \Delta m = 1 + 0.13 = 1.13$

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

step6 : $epoch = epoch + 1 = 2$

step7 : if (epoch > epochs)

no

else

goto step3

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

$= \frac{-1}{2} [(3.4 - (1.13)(0.2) + 0.57)(0.2) +$

$(3.8 - (1.13)(0.4) + 0.57)(0.4)]$

$= -1.158$

$\frac{\partial E}{\partial c} = \frac{-1}{n} \sum_{i=1}^{n} (y_i - mx_i - c)$

$= \frac{-1}{2} [(3.4 - (1.13)(0.2) + 0.57) + (3.8 - (1.13)(0.4) + 0.57)]$

$= -3.83$

step4 : $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.1)(-1.158) = 0.1158$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.1)(-3.83) = 0.3831$

step5: $m = m + \Delta m = 1.13 + 0.1158 = 1.2458$

$c = c + \Delta c = -0.57 + 0.3831 = -0.1869$

step6: epoch = 2 + 1 = 3

step7: if (epoch > epochs)

yes, goto step8

step8: print(m, c)

$m = 1.2458$

$c = -0.1869$