Assignment - 7

Batch gradient descent

Sample	x	y
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

S-1 :- [x, y], m = 1, c = -1, η = 0.1, epocs = 2, ns = 2

S-2 :- itr = 1

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

$= -\frac{1}{2}\left[(3.4 - (1)(0.2) + 1)0.2 + (3.8 - (1)(0.43) + 1)0.4\right]$

$= -1.34$

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

$= -1/2\left[(3.4 - 0.2 + 1) + (3.8 - 0.43 + 1)\right]$

$= -4.3$

S-4 :- $\Delta m = -\eta \cdot \frac{\partial E}{\partial m} = (-0.1)(-1.34) = 0.134$

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

S-5 :- $m = m + \Delta m = 1 + 0.134 = 1.134$

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

S-6 :- itr = itr + 1 = 1 + 1 = 2

S-7 :- if (itr > epocs) : goto s-8

else goto s-3

S-3 :- $\frac{\partial E}{\partial m} = \frac{-1}{2}\left[(3.4-(1.13)(0.2)+0.57)0.2+\right.$
$\left.(3.8-(1.13)(0.4)+0.57)0.4\right]$

$= -1.157$

$\frac{\partial E}{\partial c} = \frac{-1}{2}\left[(3.4-(1.13)(0.2)+0.57)+\right.$
$\left.(3.8-(1.13)(0.4)+0.57)\right]$

$\frac{\partial E}{\partial c} = -3.82$

S-4 :- $\Delta m = (-0.1)(-1.15) = 0.115$

$\Delta c = (-0.1)(-3.82) = 0.382$

S-5 :- $m = m + \Delta m \Rightarrow 1.134 + 0.115 = 1.249$

$c = c + \Delta c \Rightarrow -0.57 + 0.38 = -0.187$

S-6 :- $it = it + 1 \Rightarrow 2+1 = 3$

S-7 :- if (it > epocs)

$3 > 2$

go to S-8

S-8 :- print m & c

$m = 1.249 \; ; \; c = -0.187$