ASSIGNMENT - 4

Simple Linear Regression:

sample(i)	x_i^a	y_i^a
1	7.6	157
2	7.1	174

Step-1: Read dataset $\eta = 0.1$, epochs = 1, m = 1, c = -1

Step-2:- Set iteration = 1

Step-3:- Set Sample i = 1

Step-4:- $Y = mx + c$

$= 1(7.6) - 1$

$= 6.6$

Step-5:- $E = \frac{1}{2}(y_i^a - mx_i^a - c)^2$

$= \frac{1}{2}[157 - 1(7.6) - (-1)]^2$

$= \frac{22620.16}{2} \Rightarrow 11310.08$

Step-6:- $\frac{\partial E}{\partial m} = -(y_i^a - mx_i^a - c)x_i^a$

$= -[157 - 6.6]7.6 \Rightarrow -1143.04$

$\frac{\partial E}{\partial c} = -(y_i^a - mx_i^a - c)$

$= -[157 - 6.6] \Rightarrow -150.4$

Step-7:- $\Delta m = -\eta \frac{\partial E}{\partial m}$

$= -(0.1)(-1143.04)$

$= 114.304$

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

$= -(0.1)(-150.4)$

$= 15.04$

Step-8:- $m = m + \Delta m$

$= 1 + 114.304 = 115.304$

$c = c + \Delta c$

$= -1 + 15.04 = 14.04$

Step-9:- sample $i = i+1 = 2$ & $i \leq ns$ T → step (4)

→ step-4:- $y = (115.304)\,7.1 + 14.04$

$= 832.69$

Step-5:- $E = \frac{1}{2}(174 - 832.69)^2$

$= \frac{433872.5}{2} \Rightarrow 216936.25$

Step-6:- $\frac{\partial E}{\partial m} = -[174 - (115.304)\,7.1 - 14.04]\,7.1$

$= -[174 - 832.69](7.1)$

$= (658.69)\,7.1 \Rightarrow 4676.69$

$$\frac{\partial E}{\partial c} = -(174 - 832.69) = 658.69$$

Step-7:- $\Delta m = -\eta \frac{\partial E}{\partial m}$

$= -(0.1)(4676.69)$

$= -467.669$

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

$= -(0.1)(658.69)$

$= -65.869$

Step-8:- $m = 115.304 + (-467.669)$

$= -352.36$

$c = 14.04 + (-65.869)$

$= -51.829$

Step-9:- sample $i = i+1 = 2+1 = 3$ $i \leq ns$ F → next step
3 2

Step-10:- iter = iter+1 = 1+1 = 2, iter > epochs T → next step

Step-11:- Stop.