Assignment-4

Simple Linear Regression Model

→ Manual calculation for 2 iterations and for 1st two samples in the dataset

X	Y	
7.6	157	} Training
7.1	174	
8.2	175	Testing

step-1

Read data, $\eta = 0.1$, $m = 1$, $c = -1$, epochs $= 2$, $n_s = 2$

step-2

iter $= 1$

step-3

sample $= 1$

step-4

$$\frac{\partial E}{\partial m} = -(y_i - m x_i - c) x_i$$

$$= -(157 - 1(7.6) + 1) 7.6$$

$$= -1143.04$$

$$\frac{\partial E}{\partial c} = -(y_i - m x_i - c)$$

$$= -(157 - 7.6 + 1)$$

$$= -150.4$$

step-5

$$\Delta m = -\eta\left(\frac{\partial E}{\partial m}\right) = -0.1 * (-1143.04) = 114.3$$

$$\Delta c = -\eta\left(\frac{\partial E}{\partial c}\right) = -0.1 * (-150.4) = 15.04$$

step-6

$$m = m + \Delta m$$

$$= 1 + 114.03 = 115.03$$

$$c = c + \Delta c$$

$$= -1 + 15.04 = 14.04$$

step-7

$$\text{sample} = \text{sample} + 1 = 1 + 1 = 2$$

step-8

$$\text{if}(\text{sample}^{2} \leq 2 \; n_s)$$

True → step-4

step-9

$$\frac{\partial E}{\partial m} = -(y_i - mx_i - c)x_i$$

$$= -(174 - (115.03)7.1 - 14.04)7.1$$

$$= 4662.9$$

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

$$= 656.7$$

step-5

$\Delta m = -\eta\left(\frac{\partial E}{\partial m}\right) = -0.1 * 4662.9 = -466.2$

$\Delta c = -\eta\left(\frac{\partial E}{\partial c}\right) = -0.1 * 656.7 = -65.6$

step-6

$m = m + \Delta m = 115.03 - 466.2 = -351.17$

$c = c + \Delta c = 14.04 - 65.6 = -51.56$

step-7

sample = sample + 1 = 2 + 1 = 3

step-8

$3 \leq 2$

if (sample $\leq$ ns)

false → next step

step-9

iter = iter + 1

= 1 + 1 = 2.

step-10

if (iter $\leq$ epochs)

$2 \leq 2$

True → ~~next~~ step 3

step-11 step-3

Repeat the process

step-10

if (iter $\leq$ epochs)

$3 \leq 2$

False → next step

step-11

Print m, c

Print error values