Assignment - 4 - Manual calculation

19K41A05B1

Linear regression

Data :-

X	Y
7.6	157
7.1	174

eqn: $y = mx + c$

Step 0: Initialize :- $m = 1$, $c = -1$, epochs $= 2$, $\eta = 0.1$, ns $= 2$

Step 2: iter $= 1$

Step 3: sample $= 1$

Step 4: $\frac{\partial E}{\partial m} = -(y - mx - c)x$

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

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

$= -(150.4)7.6$

$= -1143.04$

$\frac{\partial E}{\partial c} = -(y - mx - c)$

$= -(150.4)$

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:

$m = m + \Delta m = 1 + 114.3 = 115.3$

$c = c + \Delta c = -1 + 15.04 = 14.04$

Step 7: sample += 1 (sample = 2)

Step (8):- if ($i^2 <= ns$)

↳ True

go to step (4)

Step (4):-

$$\frac{\partial E}{\partial m} = -(y - mx - c)x$$

$$= -(174 - (115.3)(7.1) - 14.04)7.1$$

$$= -(174 - 818.63 - 14.04)7.1$$

$$= 4676.5$$

$$\frac{\partial E}{\partial c} = -(y - mx - c)$$

$$= -(174 - (115.3)(7.1) - 14.04)$$

$$= 658.67$$

Step (5) :-

$$\Delta m = -\eta\left(\frac{\partial E}{\partial m}\right) = -(0.1)(4676.5)$$

$$= -467.65$$

$$\Delta c = -\eta\left(\frac{\partial E}{\partial c}\right) = -(0.1)(6858.67)$$

$$= -65.8$$

Step (6):-

$$m = m + \Delta m = 115.3 - 467.65$$

$$= -352.35$$

$$c = c + \Delta c = 14.04 - 65.8 = -51.76$$

Step (7):-

sample += 1 (sample=3)

Step (8) :- if ($i^3 <= n^2 s$)

↳ false

go to step (9)

step (9) :- iter + = 1 (iter = 2)

step (10) :- if ($iter^{2}$ <= $epochs^{2}$)

↳ True

go to step (3)

Repeat .....

step (3) :- sample = 1

step (4) :- gradient calculation

step (5) :- step length calculation

step (6) :- update model parameters

step (7) :- sample = 2

→ repeat this process for 2nd iteration.

step (9) :- iter = 3

step (10) :- if ($iter^{3}$ <= $epochs^{2}$)

↳ false

go to next step.

step (11) :- print model parameters and errors.

(Testing and Training)

step (12) :- Deployment.