18K41A0588

Manual calculation

step:1 :- Read Dataset $[x,y]$, epochs=2,

$m=1$, $c=-1$, $\eta=0.1$, $ns=2$

x	y
0.2	3.4
0.4	3.8

Step:2 : iter=1

Step:3 : $E = \frac{1}{2ns} \sum (y_i - mx_i - c)^2$

$$\frac{\partial E}{\partial m} = \frac{-1}{ns}\left[\sum_{i=1}^{ns} (y_i - mx_i - c)(x_i)\right]$$

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

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

$$= \frac{-1}{2}\left[(4.2)(0.2) + (4.4)(0.4)\right]$$

$$= \frac{-1}{2}\left[0.84 + 1.76\right]$$

$$= -1.3$$

$$\frac{\partial E}{\partial c} = \frac{-1}{ns}\left[\sum_{i=1}^{ns}(y_i - mx_i - c)\right] = \frac{-1}{2}(4.2 + 4.4)$$

$$= -\frac{1}{2}\left[8.6\right]$$

$$= -4.3$$

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

$\Delta c = -\eta \dfrac{\partial G}{\partial c} = -(0.1) \times (-4.3) = 0.43$

step-5 :- $m = 1 + 0.13 = 1.13$

$c = -1 + 0.43 = -0.57$

step-6 :- $iter = iter + 1 = 1 + 1 = 2$

step-7 :- if $2 > 2$

$\Rightarrow$ false

$\Rightarrow$ Goto step 3

step-8 :- $\dfrac{\partial E}{\partial m} = -\dfrac{1}{ns}\left[\sum\limits_{i=1}^{ns}(yi - mxi - c)xi\right]$

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

$= -\frac{1}{2}\left[(3.744) \times (0.2) + (3.918) \times 0.4\right]$

$= -\frac{1}{2}\left[3.2994 + 1.5672\right] = -2.4333$

$\dfrac{\partial E}{\partial c} = -\frac{1}{2}\left[3.744 + 3.918\right] = -3.831$

Step-9 :- $\Delta m = -\eta \dfrac{dE}{dm} = -(0.1) \times (-2.4333)$

$\qquad\qquad\qquad\qquad\qquad\qquad = 0.24333$

$\qquad \Delta c = -\eta \dfrac{dE}{dc} = -(0.1) \times (-3.831)$

$\qquad\qquad\qquad\qquad\qquad\qquad = 0.3831$

Step -10 :- $m = m + \Delta m = 1.13 + 0.24333$

$\qquad\qquad\qquad\qquad\quad = 1.37333$

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

$\qquad\qquad\qquad\qquad\quad = -0.1869$

Step-11 :- iter $=$ iter $+ 1 = 2 + 1 = 3$

step -12 :- if iter $>$ epoch $\Rightarrow 3 > 2$

$\qquad\qquad\qquad\qquad\qquad\qquad \Rightarrow$ goto Step 13

step-13 :- point (m, c)

$\qquad\qquad\quad = (1.37333, -0.1869)$

step-14 :- mse of data

$mse = [3.4 - (1.37333 \times 0.2) + 0.1869]^2$

$\qquad\qquad + [3.8 - (1.37333 \times 0.4) +$
$\qquad\qquad\qquad\qquad\qquad 0.1869)]^2$

$$= \frac{[10.97089] + [11.81687]}{2}$$

$$= 11.39388$$