

Assignment - 3

①

sample	x_i^a	y_i^a
1	0.2	3.4
2	0.4	3.8

SGD optimizer.

~~3 — 0.6 — 4.2~~

~~4 — 0.8 — 4.6~~

Step 1:- read data of x, y, m, c values
 $m = 1, c = 1, \eta = 0.1, \text{epoch} = 2$

Step 2:- iter = 1

Step 3:- Sample = 1

Step 4:- $E = \frac{1}{2} (y_i - m x_i - c)^2$

$$\frac{\partial E}{\partial m} = -(y_i - m x_i - c) x_i = -0.2 (3.4 - (1)(0.2) + 1) = -0.84$$

$$\frac{\partial E}{\partial c} = -(y_i - m x_i - c) = -(3.4 - (1)(0.2) + 1) = -4.2$$

~~Step 5:-~~

$$\text{Step 5:- } \Delta m = -\eta \frac{\partial E}{\partial m} = -(0.1)(-0.84) = 0.084$$

$$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.1)(-4.2) = 0.42$$

$$\text{Step 6:- } m = m + \Delta m = 1 + 0.084 = 1.084$$

$$c = c + \Delta c = 1 + 0.42 = 1.58$$

$$m = 1.084, c = 1.58$$

Step 7:- Sample = Sample + 1 $\rightarrow 2$

Step 8:- if (Sample > 2) Step 9 X

else
step 4. ✓

(2)

Step 4:- $\frac{\partial E}{\partial m} = -(y_i - mx_i - c)x_i = -((3.8) - (1.084)(0.4) - 0.58) = -1.578$

$\frac{\partial E}{\partial c} = -(y_i - mx_i - c) = -(3.8 - (1.084)(0.4) - 0.58) = -3.9464$

Step 5:- $\Delta m = -\eta \frac{\partial E}{\partial m} = (-0.1)(-1.578) = 0.1578$

$\Delta c = -\eta \frac{\partial E}{\partial c} = 0.39464$

Step 6:- $m = m + \Delta m = 1.084 + 0.1578 = 1.2418$

$c = c + \Delta c = -0.58 + 0.39 = -0.185$

$m = 1.2418, c = -0.185$

Step 7:- Sample = sample + 1 $\rightarrow 3$.

Step 8:- if (sample ≥ 2) \rightarrow yes. Next step.

Step 9:- if iter = iter + 1

Step 10:- if (iter \geq epoch)
Next step 3.

Step 11:- ~~$m = 1.2418, c = -0.185$~~

Step 3:- Sample = 1

Step 12:- ~~Next step 3~~

Step 4:- $\frac{\partial E}{\partial m} = -0.2(3.4 - (1.24)(0.2) + 0.185) = -0.66$

$\frac{\partial E}{\partial c} = -(3.4 - (1.24)(0.2) + 0.185) = -3.33$

$$\begin{array}{r} 23 \\ 46 \\ \hline 4 \\ 24 \\ 20 \\ \hline 44 \end{array}$$

Step 5:- $\Delta m = -(0.1)(-0.66) = 0.066$

(3)

$\Delta c = -(0.1)(-3.33) = 0.333$

Step 6:- $m = m + \Delta m = 1.24 + 0.066 = 1.306$

$c = c + \Delta c = -0.185 + 0.333 = 0.148$

$m = 1.306, c = 0.148$

Step 7:- Sample = ~~50~~ 2

Step 8:- if (2 > 2)

Step 9

else

Step 4.

Step 4:- $\frac{\partial E}{\partial m} = -3.24 - 0.4(3.8 - (1.306)(0.4) - 0.148)$
 $= -1.25784$

$\frac{\partial E}{\partial c} = -(3.8 - (1.306)(0.4) - 0.148)$
 $= -3.1296$

Step 5:- $\Delta m = (-0.1)(-1.25784) = 0.125$

$\Delta c = (-0.1)(-3.1296) = 0.312$

Step 6:- $m = m + \Delta m = 1.306 + 0.125 = 1.431$

$c = c + \Delta c = 0.148 + 0.312 = 0.46$

Step 7:- Sample = 3

Step 8:- if (3 > 2)

Step 9

else

Step 4

Step 9:- iter = 3

Step 10:- if (3 > 2)

Step 11

else

Step 3

Step 11:- $m = 1.431, c = 0.46$