

Assignment - 7

let consider a sample dataset have one input (x_i) and one output (y_i^a) and number of samples
a develop a sample linear regression
model by using Batch Gradient descent
(BGD)

Sample	x_i^a	y_i^a
1	0.2	3.4
2	0.4	3.8
3	0.6	4.2
4	0.8	4.6

→ Do Manual calculations for iterations with
1st & 2nd samples

Step 1: $[x, y]$, $m=1$, $c=-1$, $\eta=0.1$, epochs=2
 $ns=2$

Step 2: iter = 1

Step 3: $\frac{\partial E}{\partial m} = -\frac{1}{ns} \sum_{i=1}^{ns} (y_i - mx_i - c)x_i$

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

$$= -1.34$$

$$\frac{\partial \epsilon}{\partial c} = -\frac{1}{2} [(3.4) - 0.2 + 1) + (3.8 - 0.4 + 1)]$$

$$= -4.3$$

step 4: $\Delta m = -\eta \frac{\partial \epsilon}{\partial m}$

$$= -0.1 \times -1.34$$

$$\Delta m = 0.134$$

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

$$= -0.1 \times -4.3$$

$$\Delta c = 0.43$$

step 5: $m = m + \Delta m$

$$= 1 + 0.134 = 1.134$$

$$c = c + \Delta c$$

$$= -0.1 \times -4.3 = 0.43$$

step 6: $iter = iter + 1$

$$1 + 1 = 2$$

step 7: if ($iter > epochs$) : goto step 8

$$2 > 2$$

else: goto step 3

$$\begin{aligned}\text{step 3: } \frac{\partial e}{\partial m} &= -\frac{1}{2} \left[(3.4 - (1.134)(0.2) + 0.57)(0.2) + \right. \\ &\quad \left. (3.8 - (1.134)(0.4) + 0.57)(0.4) \right] \\ &= -1.157\end{aligned}$$

$$\begin{aligned}\frac{\partial e}{\partial c} &= -\frac{1}{2} \left[3.4 - (1.134)(0.2) + 0.57 + \right. \\ &\quad \left. (3.8 - (1.134)(0.4) + 0.57) \right] \\ &= -3.829\end{aligned}$$

$$\text{step 4: } \Delta m = -0.1 \times -1.157 = 0.1157$$

$$\Delta c = -0.1 \times -3.829 = 0.3829$$

$$\text{step 5: } m = m + \Delta m$$

$$= 1.134 + 0.1157 = 1.2497$$

$$c = c + \Delta c$$

$$= -0.57 + 0.3829 = -0.187$$

$$\text{step 6: } \text{iter} = \text{iter} + 1$$

$$2 + 1$$

$$= 3$$

$$3 > 2$$

Step 7: if (iter > epochs)

goto step 8

else

goto step 3

Step 8: $m = 1.2497$

$c = -0.1871$