

Assignment-7

18K41A0479

Sample(i)	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 2 iterations with first 2 samples.

Write the python code to build simple linear regression model using BGD optimizer.

1. $[X, Y], m=1, c=-1, \eta=0.1, \text{epochs}=2, n_s=2$

2. $\text{itr}=1$

3.
$$\frac{\partial \epsilon}{\partial m} = -\frac{1}{n_s} \sum_{i=1}^{n_s} (y_i - mx_i - c)x_i$$

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

$$= -1.34$$

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

$$= -4.3$$

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

$$= -0.1 \times -1.34$$

$$= 0.134$$

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

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

$$m+ = \Delta m$$

$$= 1 + 0.134$$

$$= 1.134$$

$$C + \Delta C = -0.1 \times -4.3$$

$$= 0.43$$

6. $itr++1$
 $= 1+1 = 2$

7. $if(itr > epochs)$
 $2 > 3$

step-3

3. $\frac{\partial E}{\partial m} = -1.157$

$$\frac{\partial E}{\partial C} = -3.829$$

4. $\Delta m = -0.1 \times -1.157 = 0.1157$

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

5. $m+ = \Delta m$

$$1.134 + 0.1157$$

$$= 1.2497$$

$$\Rightarrow -0.57 + 0.3829 = -0.1871$$

6. $itr++1$
 $2+1 = 3$

7. $if(itr > epochs)$
 $3 > 2$ step-8
 else

step-3

8. $m = 1.2497, C = -0.1871$