Batch Gradient optimization. 18K41A04D2

(Assignment - 7)

x	y
0.2	3.4
0.4	3.8

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

Step 2: $iter = 0$

Step 3: $E = \frac{1}{2n_s} \sum_{i=1}^{n_s} (y_i - mx_i - c)^2$

$$\frac{\partial E}{\partial m} = \frac{1}{n_s} \sum_{i=1}^{2} (y_i - mx_i - c)(-x_i) = (-1.78666667)$$

$$\frac{\partial E}{\partial c} = \frac{1}{2} \sum_{i=1}^{2} (y_i - mx_i - c) = -4.4$$

Step 4: $\Delta m = -\eta \left(\frac{\partial E}{\partial m}\right) = -(0.1)(-1.78666667) = 0.17866$

$$\Delta c = -\eta \left(\frac{\partial E}{\partial c}\right) = -(0.1)(-4.4) = 0.44$$

Step 5: $m = m + \Delta m = 1 + 0.17866 = 1.17866$

$c = c + \Delta c = -1 + 0.44 = -0.56$

Step 6: $iter = iter + 1 = 1$

Step 7: if (iter $\geq$ epochs)

1 $\neq$ 2

goto step 3.

Step 3: $\frac{\partial E}{\partial m} = \frac{1}{2} \sum_{i=1}^{2} (y_i - mx_i - c)(-x_i) = -1.57731556$

$$\frac{\partial E}{\partial c} = \frac{1}{2} \sum_{i=1}^{2} (y_i - mx_i - c) = -3.88885333$$

Step 4: $\Delta m = -\eta \left(\frac{\partial E}{\partial m}\right) = -(0.1)(-1.57731556) = 0.15773156$

$$\Delta c = -\eta \left(\frac{\partial E}{\partial c}\right) = -(0.1)(-3.8888) = 0.38888$$

Step 5 : $m = m + \Delta m = 1.7866 + 0.1577 = 1.336398$

$\rightarrow c = c + \Delta c = -0.56 + 0.3888 = -0.1711$

Step 6 : iter = iter + 1 = 2

Step 7 : if (iter $\geq$ epochs)

$2 \geq 2$

goto step 8

Step 8 : $m, c = 1.336398, -0.1711.$

&

MSE = 11.821657593.