Assignment - 6 19KU1A0516

polynomial Regression model:

x	y
7.6	157
7.1	174

Step-1 : Read dataset n=0.1 epochs=1 $m_1=1$ $m_2=1$ $c=1$

Step 2 : iter = 1

Step 3 : Sample i=1

Step 4 : $y_i = m_2(x_i)^2 + m_1 x_i + c$

$y_i = (1)(7.6)^2 + (1)(7.6) - 1 = 64.36$

Step-5 : $E = \frac{1}{2}(y - y_i)^2$

$= \frac{1}{2}(157 - 66.36)^2 = 4291.08$

Step-6 : $\frac{\partial E}{\partial m_1} = -[y_i - m_2 x^2 - m_1 x - c) x_i$

$= -[157 - (1)(7.6)^2 - (1)(7.6) + 1)(7.6)$

$\frac{\partial E}{\partial m} = 704.06$

$\frac{\partial E}{\partial m_2} = -[y - m_2 x_i^2 - m_1 x_i - c] x_i^2$

$= -5350.88$

$\frac{\partial E}{\partial c} = -[y_i - m_2 x_i^2 - m_1 x - c]$

$= -[157 - (1)(7.6)^2 - (1)(7.6) + 1$

$\frac{\partial E}{\partial c} = -92.64$

Step-7: $\Delta m_1 = n \frac{\partial L}{\partial m_1} = -(0.1)(-704.8) = 70.4$

$\Delta m_2 = n \frac{\partial L}{\partial m} = -(0.1)(-5350.88) = 535.08$

$\Delta = n \frac{\partial L}{\partial L} = -(0.1)(-92.64) = 9.26$

Step-8: $m_1 = m_1 + \Delta m_1 = 1 + 70.4 = 71.4$

$m_2 = m_2 + \Delta m_2 = 1 + 35.08 = 536.08$

$c = c + \Delta c = -1 + 9.26 = 8.26$

Step 9: sample $\Rightarrow i = i+1 = 1+1 = 2$ & $i \leq n \leq 7$

$\rightarrow$ Step-4

Step-4: $y_p = m_2(x_i)^2 + m_1 x + c$

$= (536.08)(7.1)^2 (71.4)(7.1) + 8.26$

$= -27538.99$

Step-5: $E = \frac{1}{2}(y_i - y_i^p)^2 = \frac{1}{2}[(74 - 7538.44)^2$

$E = 37442138.9$

Step 6: $\frac{\partial E}{\partial m} = -[y_i - m_1 x - m_1 x_i - c] x_i$

$= -(174 - 27623.79 - 506.94 - 8.23)(7.$

$= 194291.429$

$\frac{\partial E}{\partial m_2} = -[-m_2 x_i^2 - m_1 x - c)^2$

$= -(-27364.99)(7.1)2$

$\frac{\partial E}{\partial m_2} = 1379469.14.$

$$\frac{\partial E}{\partial c} = -[y_1 - m_2 x^2 - m_1 x - c]$$

$$= -(-27364.99)$$

$$\frac{\partial E}{\partial c} = 27364.99$$

Step-7: $\Delta m_1 = -n \frac{\partial E}{\partial m_1} = -(0.1)(194291.429)$

$$= -19429.14$$

$$\Delta m_2 = -n \frac{\partial E}{\partial m_2} = -(0.1)(1374969.14)$$

$$= -137496.97$$

$$\Delta c = -n \frac{\partial E}{\partial c} = -(0.1)(27364.99) = -2736.49$$

Step-8; $m_1 = m_1 + \Delta m_1 = 71.4 - 19424.14 =$

$$= 19352.74$$

$$m_2 = m_2 + \Delta m_2 = 536.08 - 137496.91$$

$$= -136960.83$$

$$c = c + \Delta c = 8.26 - 2736.4 = 2728.2$$

Step-9; Sample $i = i+1 = 2+1 = 3$. if $i < n_3$ T ⇒ next step

3 2

Step-10; iter = iter + 1 = 1 + 1 = 2.

iter > epochs T ⇒ next step

2 1

Step-11; Stop