Assignment 6

Polynomial Regression Model :—

X	Y
7.6	157
7.1	174

step1 : Read dataset $\eta = 0.0001$, epochs = 1, $m_1 = 1$, $m_2 = 1$

$c = -1$

step2 : Iter = 1

step3 : sample $s = 1$

step4 : $y_p^i = m_2(x_i)^2 + m_1 x_i + c$

$y_p^i = 1(7.6)^2 + 1(7.6) - 1$

$= 64.36$

step5 : $E = \frac{1}{2}(y_i - y_i^p)^2$

$= \frac{1}{2}(157 - 64.36)^2 = 4291.08$

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

$= -[157 - 64.36](7.6) = -704.08$

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

$= -(157 - 64.36)(7.6)^2$

$= -5350.85$

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

$$= -(157 - 64.36) = -92.64$$

~~step 7 : $m_1 = m_1 + \Delta m_1 = 1 +$~~

$$\Delta m_1 = -\eta \frac{\partial E}{\partial m_1} = -(0.0001)(-704.06)$$

$$= 0.070406$$

$$\Delta m_2 = -\eta \frac{\partial E}{\partial m_2} = -(0.0001)(-5350.85)$$

$$= 0.535085$$

$$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.0001)(-92.64)$$

$$= 0.009264$$

step 8 : $m_1 = m_1 + \Delta m_1$

$$= 1 + 0.070406 = 1.070406$$

$$m_2 = 1 + 0.535085 = 1.535085$$

$$c = -1 + 0.009264 = -0.9907$$

step 9 : sample = sample # = 2 $\leq n_s$ True

2

↓

step (4)

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

$$= 1.5350 (7.1)^2 + (1.0704)(7.1) + (-0.9907)$$

$$= 83.988$$

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

$= \frac{1}{2}(174 - 83.988)^2 \Rightarrow 4051.08$

step 6 : $\frac{\partial E}{\partial m_1} = -(174 - 83.988)(7.1) = -639.0852$

$\frac{\partial E}{\partial m_2} = -(174 - 83.988)(7.1)^2 = -4537.504$

$\frac{\partial E}{\partial m_2} = -(174 - 83.988) = -90.012$

step 7 : $\Delta m_1 = -\eta \frac{\partial E}{\partial m_1} = 0.0639$

$\Delta m_2 = -\eta \frac{\partial E}{\partial m_2} = 0.4537$

$\Delta c = -\eta \frac{\partial E}{\partial c} = +0.009$

step 8 : $m_1 = m_1 + \Delta m_1 = 1.0704 + 0.0639 =$

$m_2 = 1.5350 + 0.4537 = 1.9887$

$c = -0.9907 + 0.0009 = -0.9898$

step 9 : sample = sample + 1 = 2 + 3

samples $\leq$ ns. $\quad$ X $\quad$ False $\rightarrow$ next step.
3 2

step 10 : iter = iter + 1 = 1 + 1 = 2 $\quad$ iter > epoch $\rightarrow$ next step.
2 1

step 11 : END