Assignment-6

Polynomial Regression Model:-

X	Y
7.6	157
7.1	174

step 1: Read dataset $\eta = 0.0001$, epochs = 1, $m_1 = 1$, $m_2 = 1$, $c = -1$

step 2: iter = 1

step 3: sample $s = 1$

step 4: $y_p^1 = m_2(x_i)^2 + m_1 x_i + c$

$Yp^1 = 1(7.6)^2 + 1(7.6) - 1$

$= 64.36$

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

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

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

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

$= -704.06$

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

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

$= -5350.85$

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

$= -[157 - 64.36] = -92.64$

step 7 : $\Delta m_1 = -\eta \frac{\partial E}{\partial m_1} = -(0.0001)(-704.06)$

$= 0.070406$

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

$= 0.535085$

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

$= 0.009264$

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 + 1 = $2 \leq n_s^2$ True ↓ step 4

step 4: $y_p^i = m_2(x_i)^2 + m_1 x_i + C$

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

$= 83.988$

step 5: $E = \frac{1}{2}(y_i - y_p^i)^2 = \frac{1}{2}(174 - 83.988)^2 = 4051.08$

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: $m_1 = m_1 + \Delta m_1 = 1.0764 + 0.639$

$m_2 = 1.5350 + 0.4357 = 1.9887$

$c_2 = -0.9907 + 0.0009 = -0.9898$

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

$\text{sample}_3 \leq n_{s_2}$ × false → next step

Step 10: ite = ite + 1 = 1 + 1 = 2

$\text{ite}_2 > \text{epochs}_1$ → next step

Step 11: END