Assignment - 4

19K41A0416

Simple Linear Regression

Sample (i)	x_i^a	y_i^a
1	7.6	157
2	7.1	174

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

Step 2 :- Set iteration = 1

Step 3 :- Set Sample $i = 1$

Step 4 : $Y = mx + c$

$Y = (1)(7.6) - 1 = 6.6$

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

$E = \frac{1}{2}(157 - (1)(7.6) - (-1))^2 = \frac{22620.16}{2} = 11310.08$

Step 6 $= \frac{\partial E}{\partial m} = (y_i^a - mx_i^a - c)x_i^a = -(157 - 6.6)(7.6) = -1143.04$

$\frac{\partial E}{\partial c} = -(y_i^a - mx_i^a - c) = -(157 - 6.6) = -150.4$

Step 7 = $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.1)(-1143.04) = 114.304$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.1)(-150.4) = 15.04$

Step 8 :- $m = m + \Delta m = 1 + 114.304 = 115.304$

$c = c + \Delta c = -1 + 15.04 = 14.04$

Step 9 : Sample $i = i + 1 = 2$ & $i \leq n$, So, Step (4)

Step 4 : $Y = (115.304)(7.1) + 14.04 = 832.69$

Step 5 : $E = \frac{1}{2}(174 - 832.69)^2 = \frac{433872.5}{2} = 216936.25$

Step 6: $\frac{\partial E}{\partial m} = -(174 - (115.304)(7.1) - 14.04)(7.1)$

$= -(174 - 832.69)(7.1)$

$= (658.69)(7.1) = 4676.69$

$\frac{\partial E}{\partial c} = -(174 - 832.69) = 658.69$

Step 7: $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.1)(4676.69) = -467.669$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.1)(658.69) = -65.869$

Step 8: $m = 115.304 + (-467.669) = -352.36$

$c = 14.04 + (-65.869) = -51.829$

Step 9: Sample $i = i + 1 = 2 + 1 = 3$ $i \leq ns$ → next step

Step 10: $iter = iter + 1 = 1 + 1 = 2$ $iter > epochs$ → Terminate step

Step 11: Stop