Assignment - 4

19K41A0447

Simple Linear Regression:

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

step 1: Read dataset, $\eta = 0.2$, 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: $E = \frac{1}{2}(y_i^a - mx_i^a - c)^2$

$= \frac{1}{2}(157 - (1)(7.6) + 1)^2$

$= \frac{282752}{2} = 11310.08$

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: $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.2)(-1143.04) = 228.608$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.2)(-150.4) = 30.08$

Step 8: $m = m + \Delta m = 1 + 288.608 = 289.608$

$c = c + \Delta c = -1 + 30.08 = 29.08$

Step 9: sample $i = i + 1 = 2$ ~~$\leq n/2$~~ $\rightarrow$ step (4)

Step 4: $y = (289.608)(7.1) + 29.08$

$= 2056.2168 + 29.08$

$= 2085.29$

Step 5: $E = \frac{1}{2}(174 - 2085.29)^2$

$= 1826514.73$

Step 6: $\frac{\partial E}{\partial m} = -(174 - (289.608)(7.1) - 29.08)(7.1)$

$= -(174 - 2056.2168 - 29.08)(7.1)$

$= -(-1911.2968)(7.1)$

$= 13570.15$

$\frac{\partial E}{\partial c} = -(174 - 2085.29)(7.1)$

$= -(174 - 2085.29)$

$= 1911.29$

Step 7: $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.2)(13570.15)$

$= -2714.03$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.2)(1911.29)$

$= -382.25$

Step 8: $m = 289.608 + (-2714.03) = -2424.42$

$c = 29.08 + (-382.25) = -353.17$

step 9: Sample $i = i+1 = 2+1 = 3$

$i \leq n_s$ F → next step

3 2

step 10: iter = iter+1 = 1+1 = 2

iter > epochs T → next step

2 1

step 11: Stop.