Assignment-4

19K41A0539

Simple linear regression

Sample(i)	X_i^a	Y_i^a
1	7.6	157
2	7.1	174

Step1:- Read dataset, $\eta = 0.1$, epochs=1, $m=1$, $c=-1$

Step2:- Set iteration=1

Step3:- Set sample=1

Step4:- $Y = mx+c$

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

Step5:- $E = \frac{1}{2}\left(Y_i^a - mx_i^a - c\right)^2$

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

Step6:- $\frac{\partial E}{\partial m} = -\left(Y_i^a - mx_i^a - c\right)X_i^a = -(157 - 6.6)(7.6) =$

-1143.04

Step7:- $\frac{\partial E}{\partial c} = -\left(Y_i^a - mX_i^a - c\right) = -(157 - 6.6) = -150.4$

Step7:- $\Delta m = -\eta\frac{\partial E}{\partial m} = -(0.1)(-1143.04) = 114.304$

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

Step8:- $m = m + \Delta m = 1 + 114.304 = 115.304$

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

Step 9:- Sample $i = i+1 = 2$ & $\underset{2}{i} \leq \underset{2}{n_s}$ T → Step ④

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

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

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

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

$= (658.69)(7.1) = 4676.69$

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

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

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

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

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

Step 9:- Sample $i = i+1 = 2+1 = 3$ $\underset{3}{i} \leq \underset{2}{n_s}$ F → next step

Step 10:- $iter = iter + 1 = 1+1 = 2$, $\underset{2}{iter} > \underset{1}{epochs}$ T → next step

Step 11:- Stop.

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