# ASSIGNMENT – 4a

Estimate the bicarbonates of well water based on its pH value using simple regression model. Consider SGD optimizer. Dataset: Union Carbide Technical Report

• Do the manual calculation for two iteration by taking only first two samples in the dataset

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

Step 1: $\eta$ = 0.01, epochs=1, m=1 and c=-1

Step 2: Set Iteration = 1

Step 3: Set Sample i = 1

Step 4: Y = 1(7.6)-1 = 6.6

Step 5: E = $0.5*(157+6.6)^2$ = 13382.48

Step 6: dE/dm = -(157+6.6) *7.6 = -1243.36 and dE/dc = -(157+6.6) = -163.6

Step 7: **$\Delta$ m = -(0.01) (-1243.36) = 12.4336 and $\Delta$ c=-(.01) (-163.6) = 1.636**

Step 8: m=1+12.4336 = 13.4336and c = -1+1.636=0.636

Step 9: Sample i=i+1=2 and 2< n, = 4

Step10: Y= (13.4336) (7.1)-0.636 = 94.74256

Step11: E=$0.5*(174+94.74256)^2$ = 36111.131

Step12: dE/dm=-(174+94.74256) *7.1=-1908.072176 and dE/dc=-(174+94.74256) = -268.74256

Step13: $\Delta$ m= -(0.01) (-1908.072176) = 19.08072176 and $\Delta$ c = -(0.01) (-268.74256) = 2.68

Step14: m=13.4336+19.08072176=32.514 and c=-1.636+2.68=1.05

Step15: Sample i=i+1=2 and 2 not < n, = 2

Step 16: iteration=iteration+1=2 and iteration not < epochs

Step17: Stop