

You are hired as a Data Scientist at a Multi-National Smartphone Company and have been tasked with designing a program to make sense of a Product Review Data obtained from a test bench qualitative survey. The test bench qualitative survey comprised of 5 persons who have been handpicked from different sections of the society and no social links amongst themselves. The persons were asked to judge the utility of a product by answering the questionnaires presented in front of them. The questionnaires are presented as below:

- On a scale of 1-10, how important is the camera provided to you with the device?
- On a scale of 1-10, how important is the amount of memory storage provided with the device?
- On a scale of 1-10, how important is the size of the screen provided to you in the device?

The results of the questionnaire are presented below:

| SL.No. | Question 1<br>Rating (X0) | Question 2<br>Rating (X1) | Question 3<br>Rating (X2) | Bought ? (0-No, 1-Yes)<br>(Expected_Y) |
|--------|---------------------------|---------------------------|---------------------------|----------------------------------------|
| 1      | 2                         | 5                         | 5                         | 0                                      |
| 2      | 3                         | 6                         | 8                         | 0                                      |
| 3      | 4                         | 9                         | 10                        | 1                                      |
| 4      | 7                         | 5                         | 1                         | 0                                      |
| 5      | 10                        | 0                         | 10                        | 1                                      |

Your senior reviewed the data and has asked you to write a program in Python.

- Firstly, take the number of persons and their questionnaire responses as input from the user of the system.
- Define variables W0, W1, W2, B.
- Randomly set the values of W0, W1, W2 and B by values within 0 to 1 using random library.
- Write a For Loop executing for 100 iterations and in each iteration, for each row of data:
  - Calculate  $\text{Actual\_Y} = W0 * X0 + W1 * X1 + W2 * X2 + B$
  - Calculate  $\text{Activation} = 1 / (1 + e^{-\text{Actual\_Y}})$
  - Calculate  $\text{Difference} = (\text{Expected\_Y} - \text{Activation})$
  - Update each W and B as
    - $W0 = W0 + 0.01 * \text{Difference} * X0$
    - $W1 = W1 + 0.01 * \text{Difference} * X1$
    - $W2 = W2 + 0.01 * \text{Difference} * X2$
    - $B = B + 0.01 * \text{Difference}$
- After termination of the loop, print the final values of set of W and B. Also print the final values of Actual\_Y for each row of data as obtained.
- Plot the values of W's and B across separate graphs for each iteration using Matplotlib library.