CSE 476 Lab Assignment – 14-03-2022/15-03-2022

Rooms	Area	Price (K BDT)
2	800	2000
2	1000	3000
3	1200	4000
3	1400	4200
3	1500	4500
4	1800	5000
4	2000	5500
5	2500	6500

1. Plot the Price vs. #Rooms and Price vs. Area using suitable diagrams.
2. Write the Linear regression formula for predicting the Price of an apartment given its number of rooms and floor area.
3. Implement Gradient Descent Optimization for estimating the parameters of a multi linear regression model in Python. [Use numpy for matrix handling].

   Here, Number of Data: N //number of rows

   Number of Features = M // number of columns
   i. Make the input matrix X of size (N X M)
   ii. Scale each feature, i. e. divide each x_i by Max(x_i)
   iii. Append a column of ones at the beginning of X to make the matrix (N X (M+1))
   iv. Make the output vector Y of size (N X 1)
   v. Initialize the weight vector B of size ((M+1) X 1) with small random numbers.
   vi. Set an error threshold L, maximum number of iterations MaxIt and learning rate η.
   vii. For Loss > Threshold L or until Max Iteration exceeds:
      a. Calculate predictions, P = X dot B
      b. Calculate error, E = Y – P
      c. Calculate MSE = (1/2M) E^TE
      d. Calculate gradient of error, ∂E/∂B = (1/M)(P - Y)X **[Recheck formula]**
      e. Update B = B - η. ∂E/∂B
   viii. Print the model weights B
4. Show the changes in error in a plot.
5. Print the estimated model.
6. Calculate total loss for your estimated model.
7. Generate some test data and predict the Price for that using your model.
8. Implement Multi-Linear Regression using Python's Library.
9. Repeat Tasks 5-7 and compare.
10. Submit your notebook in classroom in the format Lab2_FullRegistrationNumber.ipynb. or Lab1_FullRegistrationNumber1_ FullRegistrationNumber2.ipynb.