IS712 Machine Learning
Lab Assignment 1

1. **Use Matlab/ Octave to code the implementation of the Linear Regression algorithms for regression tasks. You need to implement two types of solutions:**

- **Analytical** approach: closed-form solutions;
- **Iterative** approach: solved by batch gradient descent algorithms.

2. **Evaluate your implementations on the following two datasets.**
https://archive.ics.uci.edu/ml/machine-learning-databases/wine-quality/winequality-white.csv
(Data description: https://archive.ics.uci.edu/ml/datasets/Wine+Quality)

https://archive.ics.uci.edu/ml/machine-learning-databases/00291/airfoil_self_noise.dat
(Data description: https://archive.ics.uci.edu/ml/datasets/Airfoil+Self-Noise)

For the convenience to review your code, please make the following refinements:

Your code submission should be able to run with a command such as "octave main.m airfoil_self_noise.dat iterative" (please put down your commands in the README.md file).

Your code should print out the loss for the first 10 iterations (if available) and the final loss in average for training, validation, test data sets respectively. (Some visualization is also encouraged in the assignment report.)

Output example:
Iteration 1 loss: 7924.217262
Iteration 2 loss: 3888.065231
Iteration 3 loss: 1912.154202
Iteration 4 loss: 944.046528
Iteration 5 loss: 469.392345
Iteration 6 loss: 236.525564
Iteration 7 loss: 122.207095
Iteration 8 loss: 66.046535
Iteration 9 loss: 38.433228
Iteration 10 loss: 24.840502
Final loss for training data: 11.346104
Final loss for validation data: 22.528841
Final loss for test data: 24.905013

A sample code can be downloaded from e-learn.

Trick for Matlab/Octave code: Try to use more matrix operations for the optimization rather than the "for" loop in the implementation.