National Taiwan University **Introduction to Machine Learning and Deep Learning**
Department of Civil Engineering Instructor: C.-S. CHEN

Homework 4
Programming and Essay, Due 21:00, Wednesday, December 1, 2021

Late submission within 24 hours: score*0.9;
Late submission before post of solution: score*0.8 (the solution will usually be posted within a week); no late submission after the post of solution)

Total 60%
Updated in November 25 2021

1. **(60%)** Consider the perceptron model covered in the class and implement the perceptron algorithm from scratch. Please implement the perceptron algorithm.

   In this homework, please train your algorithm with provided hw4.csv.

   The hw4.csv provides the training data. The first five numbers of each row are features and the last number is the class label.

   We will train the algorithm with following hyperparameter (or configuration)

   learning_rate = 0.1, number of epoch = 10, initial_weight = 0.5

   You should receive six weights in each epoch and 60 weights in total after training all the epoch. Please save the weights into csv_file with the same format as provided sample_submission.csv. The csv should be a 10 x 6 csv file. Each row represents the weights of each epoch. Each column represents the corresponding weight. Please save your weights to the second digit after the decimal point. And please use round up instead of ceiling to match the debugging code. ~~Don't round the number, just clip the number after the second digit.~~

   Last, upload your csv file with the name.

   `YourStudentId.csv`

   We also provide an executable file called pcl for you to debug your code. The pcl file will train the algorithm with hw4_testing.csv instead of hw4.csv. The hw4_testing.csv contains only four features in each data which means there's only five weights in each epoch.. So don't directly copy the number generated from pcl.

   Both hw4.csv and hw4_testing.csv contain only ten data.

- **Submission Format:** Please compress the .csv file into `yourStudentId_hw4.zip`, then upload it to NTU COOL.