Introduction to Machine Learning (Spring 2019)

Homework #4 (50 Pts, May 22)

Student ID _____

Name _____

Instruction: We provide all codes and datasets in Python. Please write your code to complete Perceptron & MLP. Compress 'Answer.py' & your report ONLY and submit with the filename 'HW2_STUDENT_ID.zip'.

(1) [30 pts] Implement Perceptron & MLP in 'Answer.py'.

    (a) [Perceptron, 10 pts] Implement sign function and perceptron in 'Answer.py' ('sign', 'Perceptron').

    Answer: Fill your code here. You also have to submit your code to i-campus.

    (b) [MLP, 20 pts] Implement activation functions and MLP layers in 'Answer.py' ('Sigmoid', 'ReLU', 'Input/Hidden/(Sigmoid, Softmax) Output Layers').

    Answer: Fill your code here. You also have to submit your code to i-campus.

NOTE: You should write your codes in 'EDIT HERE' signs. It is not recommended to edit other parts. Once you complete your implementation, run the check codes ('PLA_Checker.py', "MLP_Checker.py") to check if it is done correctly.

(2) [20 Pts] Experiment results

    (a) [MLP-1] Adjust 'num_epochs' and 'learning_rate' and run 'MLP_1.py' to solve XOR problem. Report training accuracy with given code and explain how the MLP solve XOR problem by analyzing values of hidden nodes.

    Answer: Fill your code here. You also have to submit your code to i-campus.

    (b) [MLP-2] Adjust hyperparameters and run 'MLP_2.py' on fashion MNIST to get the best results. Report your best results with the hyperparameters. Show the plot of training and test accuracy according to the number of training epochs with the given code and briefly explain the plot. (batch size = 100)

    Answer: Fill the blank in the table. Show the plot of training & test accuracy with a brief explanation.

Hidden 1	Hidden 2	# of epochs	Learning rate	Acc.