Deep Learning : Theory and Practice

Homework # 2
Due date: March 10, 2020

1. Find the maximum likelihood based update equations for logistic regression using Gradient Descent algorithm for both 2 class and for $K > 2$ classes.
   (**Points** 10)

2. Implement the logistic regression in PyTorch on the MNIST dataset with the following changes

   - Use the validation set from the training data set and not from the test set. The split should be 50000 for training, 10000 for validation. The original testset of 10000 samples will be used in the final testing only.

   - Run for 15 epochs of SGD training and measure the performance on validation (for each iteration) and test (on the last iteration).

   Based on the above modifications, investigate the following experiments

   (a) Four different choice of learning rate $0.001, 0.01, 0.05, 0.1$.
   (b) Four different choice of batch size $1, 32, 128, 1024$.

   What is the influence of the above parameters on the validation and test accuracy.
   (**Points** 50)