CMSC 510 – Fall 2022

Homework Assignment 3

Announced: 10/18

Due: Monday, 11/7, 5pm

The problem

- Implement and test:
  - Logistic regression (LR) with L_2 regularization
    - Do not perform regularization on the bias term
- Use tensorflow library
- Two-class classification problem:
  - Classify two digits from MNIST dataset

Dataset and classification model

- MNIST: a 10-class classification problem
- Convert it into 2-class problem by: taking last digit of your V# (class A), taking last different digit of your V# (class B)
  - E.g. V# V00078965: 6-vs-5, V00078966: 9-vs-6
- During training, train on the whole training set, and also apply the model to test set, to see how training error and testing error evolve during training
  - Error: % of predictions that are not classified correctly
- The model should be:
  - A linear model ($w^T x+b$)
  - Classes (true y) encoded as a single number: +1 / -1
  - Use logistic loss from course slides:
    - $\log(1+\exp(-y(w^T x+b)))$

Returning the Assignment

- Solution code should be written by you and you only (no web/book/friend/etc. code)

- Upload through Canvas
  - A jupyter notebook with:
    - Code in python for solving the MNIST classification problem
    - Results of tests of the method on MNIST dataset – include the plot of training-set loss during epochs of training, and test set accuracy during epochs of training (include you V#, and what are your two digits defining the two-class problem)