Selected Topics From CS: Assignment 2

Due date and time: April 5^{th} 11:55 pm

The goal of this assignment is to implement a neural network to classify handwritten digits from 0-9. All submission should be in C, C++ or Java. Matrix and vector manipulation libraries are allowed.

1 Neural Network

- 3-layered network (Input(64 units), Hidden , Output(10 units)). Vary hidden layer size from 5-10.
- initialize all weights to random values between -1 and 1.
- use cross-entropy error function (Refer Bishop Section 4.3.4).
- use minibatch gradient descent with momentum and adaptive learning rate. Set batchsize=100.
- use validation set to control number of iterations, i.e stop training when error on validation set increases. With maximum number of iterations set at 3000.

2 Dataset

The dataset came form uci repository's "Optical Recognition of Handwritten Digits". Each row contains 65 values. First 64 are input attributes in range [0,1] the last value is class code from 0 to 9.
The dataset is split into 3: train.txt (3100 instances), test.txt(1670 instances)

and validation.txt(850 instances). Use train.txt for training, test.txt for testing, and validation.txt as the validation set. **Train, test and validation sets will be uploaded on CMS**.

3 Report and Code

The Report should contain both accuracy over test set and number of training iterations for each hidden layer size(5-10). Also upload code file in the format specified below.

- for Java users submission format is java_your ID_somename.txt. For example student with ID:2014A7PS123H should submit java_2014A7PS123H_somename.txt .
- for C, C++ users submission format is cpp_your ID_somename.txt. For example student with ID:2014A7PS123H should submit cpp_2014A7PS123H_somename.txt .

Only one person from a group should submit the assignment.
For queries contact: Jinu Sunil
f20130423@hyderabad.bits-pilani.ac.in