Project 5

Assigned Nov 16, 2017 Due Dec 07, 2017 (Just before midnight)

Goal

The purpose of this project is to experiment with Convolution Neural Networks and use them in a deep learning framework to perform image classification tasks.

Method

Toolkit : http://www.vlfeat.org/matconvnet/

You are free to choose other deep learning libraries as well.

Machines : Can run on CPUs (would be slower) as well as GPUs, CADE has 35-40 GPU machines with Linux and similar numbers running Windows.

Installation: http://www.vlfeat.org/matconvnet/install/#compiling

Linux : Easy installation (tested)

Windows: Not tested

Mac : Would recommend to avoid as OS X does not have gcc compiler and might need little more work.

Experimentation

- Train and test on MNIST data
  - Visualize the weights on first layer
  - Modify architecture at the output (keep the old weights in network), and train the new network to discriminate odd/even numbers (train/test).
- Build system from this digit network (unmodified network) to read hand written zip codes.
  - Proposed architecture - use threshold/connected components, bounding boxes, rescale patches, classify
  - test on your own writing
- Develop/find another dataset for discrimination task.
  - Find datasets with at least several thousand examples of each category (rescale as needed).
  - E.g. cats and dogs (e.g. CIFAR has different categories of images).
  - Modify network as needed (size of input, # of output nodes)
  - Train and test (play with parameters, learning rates, etc., as needed).
  - Report your results.
  - Hint: we are not looking for perfect results.