

## CSCI4155/CSCI6505: Assignment 4

This is a group assignment where you have to pair up with another partner. This assignment must be submitted on paper at the beginning of the class on Thursday, October 22, or left in my mailbox (talk to Barbara at the front desk in the CS building). Late submissions are not accepted.

1. Go through the deep CNN tutorial <http://www.robots.ox.ac.uk/vgg/practicals/cnn/>
2. Apply a CNN and a SVM to the MNIST dataset and discuss your results in not more than 2 pages.

Matconvnet will download MNIST, however it puts it into its 'imdb' data structure. As an alternative (for the SVM) the following will download the data into mnist.mat.

```
files = {'train-images-idx3-ubyte', 't10k-images-idx3-ubyte', ...
        'train-labels-idx1-ubyte', 't10k-labels-idx1-ubyte'} ;
data = cell(numel(files),1);
for i=1:4
    gunzip( sprintf('http://yann.lecun.com/exdb/mnist/%s.gz',files{i}) );
    f = fopen(files{i}, 'r'); x = fread(f,inf, 'uint8'); fclose(f);
    delete(files{i});
    if i<=2; x = permute(reshape(x(17:end),28,28,[]), [2 1 3]);
    else x = x(9:end)';
    end
    data{i} = x;
end
[xtrain,xtest,ytrain,ytest] = data{:};
save mnist.mat xtrain xtest ytrain ytest
```

### For 6505 (grad) students

Given are samples from two classes that both have a Gaussian distribution. Both classes have a variance of 1, and the only difference is that the first class has an average of 1 and the second class an average of 4. Calculate the best possible (theoretical) classification performance.