Assignment A9: Classification

CS 4640
Fall 2019

Assigned: November 2019

Due: 6 December 2019

Some notes:

- No scripts
- All functions must have CS4640 prefix
- Indent headers correctly (5 spaces indented lines) and put required info
- Do not exceed 72 characters per source line
- Do not write to interpreter, read or write files

1. Develop your own Bayes classifier for the 50 character set using multivariate normal models. This includes defining the feature space, building a classifier, testing the classifier, and reporting on its performance. In the report, discuss each of these steps in detail, and inparticular, describe how the individual character models were determined. Develop a Matlab function, *CS4640_Bayes*, which works as follows:

```
function [im_cc,classes] = CS4640_Bayes(im)
% CS4640_Bayes - Bayes classifier for characters
% On input:
%     im (MxN array): binary image
% On output:
%     im_cc (MxN array): labeled commected components of im
%     classes (nx1 vector): labels for connected components
%       0: not identified as a character
%       1-50: one of the characters in the set
```

```
% Call:
%     [imcc,classes] = CS4640_Bayes(mask);
% Author:
%     <Your name>
%     UU
%     Fall 2019
%
```

2. Develop a neural net classifier for the lower case letter 'e' based on the data in chars45.mat. Report performance in terms of overall success in classifying this letter (state how many were correctly identified and how many non-'e'characters were classified as an 'e' character. Develop your own function, *CS4640_NN_e*, which takes in a binary image, and classifies each connected component as a 'e' or not.

```
function [im_cc,classes] = CS4640_NN_e(im)
% CS4640_NN_e - neural net classifier for character 'e'
% On input:
%     im (MxN array): binary image
% On output:
%     im_cc (MxN array): labeled commected components of im
%     classes (nx1 vector): labels for connected components
%       1: is an 'e'
%       2: is not an 'e'
% Call:
%     [imcc,classes] = CS4640_NN_e(mask);
% Author:
%     <Your name>
%     UU
%     Fall 2019
%
```