Structure of Final Assignment Pattern Recognition

Construction of a Digit Recognition system

# 1 - Introduction

* Describe the scenario/case that our company is faced with.
* Talk a bit about the NIST data set
* Overview of construction of the digit recognition system (pre processing the images, creation of prdataset, features extraction, dissimilarities, feature selection, etc).
* Objectives:
  + For scenario 1 (large training data, i.e: 200 - 1000 objects per class): error of the classifier bellow 5%
  + For scenario 2 (small training data , i.e:10 objects per class): error of classifier bellow 25%

# 2 - Classifier optimization process

## Step 1: Pick a type of data

3 ways of representing the data:

1. Pixels
2. Features
3. Dissimilarities (clusters)

## Step 2: Playing with data dimension (only for 2 and 3)

Feature/dissimilarity measure and reduction. Describe feature reduction and selection concept.

Chose a type of measurement and explain why (find out what are the best measurements for features related to gray scale images, and then describe it briefly)

## Step 3: Determine optimal classifier

For each representation determine the optimal classifier and its type:

* Parametric: nmc, ldc, qdc, fisherc, loglc
* Non parametric: knnc, parzenc
* Advanced: neural networks, support vector classifier, one-class classifiers, combining classifiers

## Step 4: Showcase results

Make a table/graph/histogram with the results of performance of each classifier.

## Step 5: Apply the optimal classifier on novel data

Generation of new data from prnist? Or is this A.4?

**We should start immediately making notes of every step of this process so that we have less work in the end.**

# 3 - Calculation of the overall performance using benchmark data

Compute the performance using the function nist\_eval(filename,w,n) - only works in the lab computers. I am guessing that nist\_eval contains the benchmark data that we don't have access to. Steps from the document:

1. Write a functon a=my\_rep(m) in wich m is a NIST Measurement set and a the resulting dataset. So I think this our function getDataset
2. compute your classifier as PRTools classifier w in which dimension reduction and classification are incorporated, so a\*w\*labeld should generate the proper labels; Here we use the optimal classifier from each type of data
3. Call e=nist\_eval(filename, w,n) in which filename is the filename for the my\_rep routine.

Make a table with the results of performance of the optimal classifiers from both scenarios and compare

# 4 - Bonus points

## Live test

* use a scanner to read in an image of a sheet of paper on which you have written a test set of digits;
* segment the individual digits out of the resulting image;
* classify the digit images.

## Recommendations

* will having more training data help?
* would other features help?
* does the application require reject options?
* does a single classifier suffice for all digits on a bank cheque?
* what is the role of time constraints?

# 5 - Conclusion

Comment on the difference of performances of the classifiers with regards to the scenarios and of each type of data (representation). Try to figure why such differences.