**CS 557 STATISTICAL PATTERN RECOGNITION AND LEARNING**

**FALL 2015**

**ASSIGNMENT 4**

**DUE: October 17, 2015.**

**PROBLEM**

1. Read the datasets in the file ‘music.mat’. This is a subset of a dataset of music symbols taken from:

<http://www.cvc.uab.es/~afornes/datasets/datasets.htm>

Please see Fornés' paper cited at the end for more details:

These images are gray scale images and have all been rescaled to 20x20 images. You can view an image as (e.g., at row 1):

X = trainX(1,:);

im=reshape(X,20,20);

imagesc(im);

2. You have trainX and trainY for tuning your model.  You have to make submissions on the test set.

3. Ignore the labels and apply LDA on this dataset for multiple classes. Make a scatter plot of this dataset after the transformation in 2D, giving different symbols to each class. After applying LDA, use your nearest neighbor MAP classifier to classify all points and report the balanced accuracy/error rate.

4. Ignore the labels and apply MDS on this dataset for multiple classes. Make a scatter plot of this dataset after the transformation, giving different symbols to each class. After applying MDS, use your nearest neighbor MAP classifier to classify all points and report the accuracy/error rate.

5. Ignore the labels and apply LLE (embed in the 2D space) on this dataset for multiple classes and different values of k. You have to try at least 5 different values of k and make a scatter plot of at least two of them. Apply the nearest neighbor MAP classifier to classify all points for all the different values of k and report the accuracy/error rate for all of them.

6. Submit the results on the test set at the following website (this part is mandatory for the assignment to be graded):

<https://inclass.kaggle.com/Competitions>

Give your 3 best scores on kaggle on the test set in your report.

**NOTE:**

When you make the figures, make sure you make a legend and label all axis.

**TO SUBMIT**

1. Make a folder with your roll number as folder name. Put Matlab’s/Python’s source code in it and place it in the ‘submit assign4’ folder on xeon. PLEASE DO NOT EMAIL
2. **Hard** **copy** of a report which is **not more than two pages** long that describes all the results of your experiments AND YOUR CONCLUSION and COMMENTS ON THE RESULTS.

**REFERENCES**

A.Fornés, J.Lladós, G. Sanchez, "Old Handwritten Musical Symbol Classification by a Dynamic Time Warping Based Method", in Graphics Recognition: Recent Advances and New Opportunities. Liu, W. and Lladós, J. and Ogier, J.M. editors, Lecture Notes in Computer Science, Volume 5046, Pages 51-60, Springer-Verlag Berlin, Heidelberg, 2008.