Background reading:

Read the chapters 8 and 9 in Gold & Morgan, on pattern recognition

Reading assignment:

“Construction and evaluation of a robust multifeature speech/music discriminator,” E. Scheirer and M. Slaney, Proc. ICASSP-97 Munich, 1331-1334. This is a very thorough paper looking at the problem of discriminating speech from music signals; in addition to suggesting a wide range of possible features, they make an interesting comparison between different classification algorithms – although, given that it’s a short paper, their treatment of the algorithms is brief. Add the usual summary and comments to your web page.


Practical assignment:

This week you will compare different feature sets and classification schemes using the formant frequency example files from the lecture. On the web site, files fmtU.txt, fmtO.txt and fmtA.txt contain the first three formants for 50 examples of each vowel. Examples of training different classifiers are in this week’s Matlab diary,

http://www.ee.columbia.edu/~dpwe/e6820/matlab/2003-02-10-patrecog.diary

You will find all the scripts referred to by the diary in the course Matlab directory,

http://www.ee.columbia.edu/~dpwe/e6820/matlab/

(a) Build two classifiers to discriminate the U and O classes, one using a neural net and the other based on Gaussian mixture models. Use the first two formants (F1 and F2) as features. Calculate the error rate of each classification scheme by writing a Matlab function to take the various activations/likelihoods of each class, make the actual classifications, and compare the results to the ground truth labels. Divide the data into two parts; use one half to train, and the other half to test; report the error rates for each classifier.

(b) Randomize the assignment of the data between training and test sets and repeat several times. How much variation do you see in error rate?

(c) Repeat part (a) the data from all 3 formants.

(d) Draw conclusions about the performance of the different classifiers and features on this task. Remember to include a script to reproduce your results.

Project:

Continue refining your project ideas and update web page with a more developed plan. By the end of this week, I intend to have contacted each of you via email to give you feedback on your ideas so far.