

## BME 51:186 — Homework 8

**DUE: 5 PM December 10, 2004**

**No late homework accepted!**

In this assignment you will train and test a classifier to distinguish two different types of regions. You should do this assignment using MATLAB.

**How to turn in your assignment:** To submit the homework, use the “grade” program as with the earlier homeworks. Submit a brief HTML writeup along with the MATLAB code used to solve the problem.

**The problem:** This is a two class classification problem. Training and testing feature data for classes “c1” and “c2” have already been computed and are stored in files `c1training.dat`, `c2training.dat`, `c1testing.dat`, `c2testing.dat`. Each file contains 60 rows of data, where each row corresponds to one feature vector. Four features are available for each case: region area, region mean graylevel, region minimum graylevel, and region maximum graylevel. These features appear, in that order, in columns one to four in each row of the data files. You can read this data into a MATLAB variable `s` using the command `s = load('filename.dat')`.

1. Train and test a single feature minimum distance classifier for this two class problem. Use the region area as your feature. Plot the training data in the 1D feature space using different symbols for the two different classes. Report classifier sensitivity and specificity for the problem of distinguishing class one regions from class two regions. Report the intra-class mean feature vectors you computed from the training data.
2. Train and test a two feature minimum distance classifier for this two class problem. Use the region area and the mean region graylevel as your features. Plot the training data in the 2D feature space using different symbols for the two different classes. Report classifier sensitivity and specificity for the problem of distinguishing class one regions from class two regions. Report the intra-class mean feature vectors you computed from the training data.
3. Train and test a three feature minimum distance classifier for this two class problem. Use the mean region graylevel, region area, and the difference between the maximum and minimum region graylevels as your features. Plot two projections of the training data using different symbols for the two different classes (i.e., first make a plot using only features  $x_1$  and  $x_2$ , and then plot using only features  $x_2$  and  $x_3$ ). Report classifier sensitivity and specificity for the problem of distinguishing class one regions from class two regions. Report the intra-class mean feature vectors you computed from the training data.