EE E6887 Statistical Pattern Recognition

Homework #2

Due Date: Sept. 28st 2005 Wed. 1pm

Complete any two of the following three.

P.1
DHS textbook Problem 26(a), 26(b) and 26(e)

P.2
DHS textbook Problem 48(a), 48(b), and 48(c)

P.3 (Matlab Exercise) EM and GMM parameter estimation

(a) Read the dataset from file "hw2-gmm-test.txt" (plain text format) or "hw2-gmm-test.mat" (Matlab data format). These commands are useful for reading input data
.
    load hw2-gmm-test;   data=load('hw2-gmm-test.txt');

Each sample is a two-dimensional feature vector. The dataset contains 1000 samples, which have been generated by a 2-mode GMM with parameters: {means $\vec{m}_0$, $\vec{m}_1$, covariance matrices Σ_0, Σ_1 and unequal priors π_0 ,π_1 }.

(b) write a program to implement the EM procedure to estimate the above parameters iteratively. Continue your simulation until the estimated parameters appear to converge.

(c) After each iteration, plot the $1/e$ equal-probability contour of the Gaussians components. In addition, plot the scatter plot of the data samples and color code each sample point to indicate the most likely Gaussian component responsible for generating each sample point.