2016 Remote Sensing - Homework 3

Gaussian Maximum Likelihood Classification (GMLC) and Uncertainty Assessment

A 2-class (ω_1 and ω_2) and 2-D feature space problem. Let $X^T = \begin{pmatrix} X_1 & X_2 \end{pmatrix}$ be a Gaussian feature vector having the following parameters:

Parameters of the bivariate Gaussian distributions of individual classes

	Parameters	
	Class 1	Class 2
Mean vector	$\begin{bmatrix} 70 \\ 130 \end{bmatrix}$	$\begin{bmatrix} 148 \\ 160 \end{bmatrix}$
Covariance matrix	$\begin{bmatrix} 784 & -546 \\ -546 & 900 \end{bmatrix}$	$\begin{bmatrix} 484 & 285.1 \\ 285.1 & 324 \end{bmatrix}$

Conduct the following works by using the 1,000 sets of random samples for ω_1 and ω_2 which you generated in Homework-2.

(1) Use the first set of random samples as the training dataset and determine the class boundaries between ω_1 and ω_2 and establish the training-data-based confusion matrix. [You should have done this in HW-2.]

(2) Consider each of the rest of 999 sets of random samples as the reference data and conduct the GMLC by using the class boundary established by the first set. Establish the reference-data-based confusion matrices.

(3) Compare the mean matrix of the reference-data-based confusion matrices against the training-data-based confusion matrix.

(4) Evaluate the standard deviation of the producer's, user's, and overall accuracies of the reference-data-based classification results.