ECE/OPTI 531
LAB7 Classification

Report due: 11/17/05 (beginning of class)

NOTE: This lab will count 15% of your semester lab score. ***DO NOT UNDERESTIMATE*** the amount of time required - start early!

Purpose: Investigate multispectral classification

Comments:

- A quick way to get familiar with classification in SADIE is to experiment on a greyscale image (**File/New/Function**). All programs work in 1-D (i.e. greyscale), as well as K-D (i.e. color or multispectral).

- Use the polygon tool (it actually only does rectangles now) to define the class training area. A dialog will pop-up asking for pixel subsampling parameters and the name of the class. The statistics are then automatically calculated and made available to the **Classify** routines. When you have trained all the sites, run either of these routines to produce the map. You can use only one site/class, but can select the sites to use for a particular classification from a longer pop-up list in the classifier routines.

- For a 3 band input image, the resulting classification map can be colored using **Classify/Signature Map**, but the colors will not necessarily correspond to those of the original image if only a few classes are present. Each class label is replaced by the class mean DN to create a new, 3-band classified image.

Maximum number of report text pages (excluding graphs, pictures): 3

Images	**header (B)**	**bands**	**lines**	**pixels**	**bits/pixel/band**	**format**
TucsonTM	512	7	200	200	8	BIL

ECE/OPTI 531
LAB7 Classification

Plan:

Using a CIR composite from the "TucsonTM" image, produce two supervised level-slice classifications: one using the 3 spectral bands and one using PC1, PC2 and PC3 obtained from a 7-band PCT. Use the following landcover classes:

vegetation
soil
asphalt
building roof (bright)
urban residential (mix of houses, soil, vegetation, asphalt)

and the same training and test pixels for both classifications. Control the value of k such that no more than 10-20% of the map is "unclassified." Compare the accuracy of the 2 maps using the class accuracies within the test sites for each class (analogous to the use of GPs for estimating accuracy of a geometric registration). NOTE: Make each test site no bigger than 25 pixels, since you will have to manually count pixels in each class in each site. Also, carefully record site coordinates for reuse between the classifications.

Do an unsupervised clustering of the original CIR image into about 10 cluster classes. Label each of the cluster classes with one of the supervised landcover classes above using:

- visual examination of the input image and cluster map
- plots of the supervised class and unsupervised cluster means on one of the band-pair scattergrams.

Produce a classification map using the labeled clusters. (use **Contrast/Table Lookup Stretch** to change the DN values in the integer-valued classification map) and compare its accuracy to that of the supervised maps above.

Determining Classification Map Accuracy

By definition, the pixels within each training site are supposed to be classified as that class. However, noise and inter-class overlap will cause a few pixels to be misclassified within the training sites. Likewise, a "test site," selected using the same criteria used to select training sites, can be used to give a less-biased estimate of map accuracy. You should expect more misclassification error in test sites than in training sites, however.

A "classification accuracy matrix" can be constructed with the columns being "apparent class" (the presumed class) and the rows being "true class" (the result from your classification). A separate matrix is calculated for training sites and test sites. The elements of the matrix are the percentage of pixels classified accordingly within either the training or test sites. The matrix allows you to see which classes are confused between each other in the classification.

app. class/ true class	a	b	c	d	unclassified
a	0.77	0.05	0.01	0.12	0.05
b	0.13	0.74	0.03	0.06	0.04
c	0.09	0.12	0.41	0.32	0.06
d	0.05	0.03	0.37	0.47	0.08