ECE/OPTI 531
LAB3 *Spectral Transforms*

Report due: 9/29/05 (beginning of class)

Purpose: Investigate various spectral transforms

Comments:

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
cupritetm	512	6	200	200	8	BIL
marana432tm	512	3	200	200	8	BIL

Plan:

- For "marana432tm" and "tucsontm" (use uncalibrated DNs)
    - Find a threshold value on the NDVI that separates "not vegetation" from "vegetation" for the image "marana432tm." Describe how you determine the "optimum" threshold.
    - Estimate the total acreage (in hectares) of growing crops in "marana432tm" using your "optimum" threshold.
    - Use the same threshold to estimate the total acreage (in hectares) of parks in "tucsontm" and of vegetation (in hectares) in "cupritetm." Does it appear to produce a correct answer?

- For "cupritetm"
    - Show that the sum of PC variances equals the sum of band variances
    - Plot the PC variances versus component index (as in Fig. 5-9 to 5-12)
    - How many PC components are required to "capture" at least 97% of the total image variance?

    - Produce a PC (decorrelation) stretch of a color composite of bands 4 - 6. *Prove* that the PC-stretched "bands" are, in fact, decorrelated.

    - Design color space enhancement procedures that will
      1. maximize the saturation at every pixel to 255
      2. equalize the probabilities of all colors
      3. stretch the value (intensity) to the range 0-255

      Apply your procedure to bands 4 - 6 of "cupritetm" and compare the results for effectiveness in enhancing spectral content of the image.