ECE/OPTI 531
LAB4 Spatial Transforms

Report due: 10/18/05 (beginning of class)

Purpose: Investigate spatial convolution transforms

Comments:

1. The spatial filter operations are restricted to single-band images.
2. "Verify *numerically*" means to use *sample pixel values and hand calculations* for verification and to document your calculations. Pictures of processed images are insufficient.

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

Images	header (B)	bands	lines	pixels	bits/pixel/band	format
marana432tm	512	3	200	200	8	BIL

Use band 4.

Plan:

• Verify *numerically* that the simple spatial frequency model (image = LP + HP) as given in Eq. (6-1) is true for 3x3 and for 5x5 spatial filter windows. (You will see small errors in the border region)

• Verify the image statistics and histogram properties of LP and HP-filtered images, as shown in Fig. 6-8 and described in the text.

• Verify *numerically* that sequential convolution of an image using linear filters is the same as a single convolution of the image with a net filter, which is a convolution of the component filters (Eqs. 6-7 and 6-8). (You will see small errors in the border region)

• Create and apply two azimuthal edge enhancement filters that are optimized for the angles of roads and fields in the Marana image (see Table 6-4).

• Create a gradient magnitude image from the images produced by the two azimuthal filters designed above. Compare its performance visually to the gradient magnitude images produced by the "library" Roberts and Sobel gradient filters.