ELEC 539 Digital Image Processing
Project 1: Image Compression

Due: Friday 9 April 1999

The goal of the project is an open-endend investigatation of image compression techniques in groups of four (4). Follow these golden steps for maximum success:

1. Form a group and inform Justin of your group name and members by Thursday 25 March at midnight.
2. Read some of the reference sources on reserve in the library, including Jain, Lim, Gonzalez and Woods, Castleman (for wavelets), and (optionally) the JPEG bible (reference below).
3. Based on what you learned, implement an image coder. Feel free to use any technique in the areas of pixel, predictive, or transform coding.
4. Test your coder on some representative images. (You may want to surf the Internet for some additional images.) Make plots of mean-square-error (or peak-signal-to-noise ratio, PSNR) versus number of bits-per-pixel. The PSNR of an $N \times N$ image is defined as

   $$PSNR := 10 \log_{10} \frac{255^2}{MSE}$$

   with

   $$MSE := \frac{1}{N^2} \sum_{m,n} |x[m,n] - x_c[m,n]|^2$$

   and x the original image and x_c the compressed image.
5. Report your results in a 10 page (max) writeup. Make your report a web page, and send Justin the URL.

Further useful references:

M. Pennebaker and J. Mitchell, *JPEG Still Image Data Compression Standard*, Van Nostrand Reinhold, New York, 1993.

J. Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients," *IEEE Trans. Signal Proc.*, vol. 41, no. 12, pp. 3445–3462, Dec. 1993.