Project: ESE 558 Digital Image Processing
Spring 2002, SUNY at Stony Brook, Murali Subbarao
Due in three weeks, Credit towards final score: 15%

1. Choose only one out of the following two sub-projects:

   (a) Zoom-in/Zoom-out: Write a program to shrink or magnify a jpeg format color image. The factor of zoom-in/zoom-out is specified as a command-line argument. It is expressed as an integer percentage of the original size in the range 25 percent to 400 percent. Use the bilinear interpolation method discussed in class for the intensity component.

   (b) Enhancement: Write a program to equalize the intensity histogram of a jpeg format color image.

2. *Spatial domain filtering:* Write programs to filter a color image in jpeg format with the following filters: (i) 3x3 median,(ii) 5x5 convolution. Apply the filters to the intensity component as discussed in class. For simplicity, you need not filter the border pixels. For convolution, the floating point filter coefficients should be read from a file specified on command-line as below:

   convolve filter-file < in-pic-file > out-pic-file

   Visually compare the output pictures.

3. *Frequency domain filtering:* Write a program to low-pass filter a 128x128 jpeg format color image as follows. Compute the Discrete Fourier Transform of the intensity componentof the image, set all frequency components corresponding to $|u| > 8$ or $|v| > 8$ to be zero (where u and v are spatial frequencies corresponding to x and y image coordinates), and compute the inverse Discrete Fourier Transform. Then compute and output the resulting jpeg format filtered color image. It is not necessary to use the FFT algorithm.