MAT 331 Fall 2018, Homework 2
Image compressions with dyadic squares
Due Tuesday, September 25

The files referred to in this assignment can be downloaded from the class webpage under the scripts for September 20:
`http://www.math.stonybrook.edu/~bishop/classes/math331.F18/Scripts/Sept20/`

(1) Load the file `Rose_coeff`. How many coefficients are in this file? Use the function `coeff2image` to reconstruct the image using all the coefficients and then using all coefficients larger than 10 (in absolute value). What pecentage of all coefficients is this?

(2) Include both images in your homework.

(3) Load the file `Adams_image`. Compute the coefficients using the function `image2coeff`. How many coefficients are there? Sort the absolute values of the coefficients. What is the size S of the 50,00th largest one? Becuase different coefficients can be equal to each other, there could be others that have equal size to this one. How many coefficients have greater or equal size to this one? Reconstruct the image using these 50,000+ coefficients that have absolute value S or larger. Include both the original and your reconstructed image in the homework.

(4) Load the file `Adams2.jpg`. Convert to a grayscale image using `rgb2gray`. You should get a 635×800 sized array. Take a 512×512 subset of the image (you may choose which subset to take) and compute the coefficients. Reconstruct the image using the largest 5% (of the coefficients (in absolute value). Include three figures: the original, your 512×512 subset, and your 5% reconstruction.

(5) Write a script that computes the coefficients and reconstructs a compressed color image. There should be two inputs: the file containing a 3 dimensional color image array and the truncation level for the compression. The script should call the scripts from class `image2coeff.m` and `coeff2image.m`. You should not rewrite these scripts! Your script should show the three different black and white images and the combined color output. (if you don't have a color printer, then it is Ok to just hand in the black and white printout of the last picture).

To test your script, load the file `Fall_image.mat`. This is a $512 \times 512 \times 3$ that represents a color picture. Reconstuct it using coefficients with absolute value greater than 15. It should look like the picture stored in `Fall_compressed.mat`.