Lab3 Thursday 19 April, EE264 Image Processing and Reconstruction

Homework is due next Thursday, please email a script that does all the tasks below and plots the images to sara@ucsc.edu. (You don't need to save the images this time.)

We can go through everything again in the next Lecture and Lab class to work out and resolve any problems or difficulties!

1) Interpolation
   a. Using the **nearest neighbor value in a forward interpolation**, write your own MATLAB script that uses matrix operations to **resize the image** 'clock-crop2.png' (Fig. 1, available to download on the course website) from 920x920 to 1200x1200 pixel size.
   b. Do the same thing as in *a* except use **backward interpolation**.
      (i.e. make an empty matrix that will contain the new imag and for each pixel in this matrix, pick a a value from the original matrix)
   c. Now, write a script that resamples the clock using **bilinear interpolation**.
   d. And, write a script that resamples the clock using **bicubic interpolation**.
   e. What happens if you chose different arithmetic such as mean *vs.* median *vs.* max or min value when you perform this operation? Try at least two of these options.
   f. Write a paragraph (using proper, college level English) discussing the different methods and performance you have explored in a-d of the different approaches of resizing the image.



**Fig. 1** Image of a part of a chronometer face.

2) Make the following geometrical distortions to the clock-face image, using the affine transformations in MATLAB with **maketform()**
   a. Rotate the clock face 90 degrees
   b. Rotate the clock face 20 degrees (Note: you will need to make the image bigger to not lose the edges)
   c. Shear the clock face

HELP EXAMPLE ON AFFINE TRANSFORMATIONS:
T = maketform('affine',[.5 0 0; .5 2 0; 0 0 1]);
    tformfwd([10 20],T);
    I = imread('cameraman.tif');
    transformedI = imtransform(I,T);
    figure, imshow(I), figure, imshow(transformedI)

Remember: To get help on how to use the commands, such as the tformfwd, simply type "help tformfwd" in the MATLAB command window.