Assignment 2
Deadline: 23rd Sep, 11:59PM

Input image is provided in another file.

Q1. In this exercise you will perform geometric transformation. Let the input image be I, transformation be T and output be O.
a. Compute joint transformation for translation of (50,50) followed by rotation of 10 degree.
b. Use the above transformation to obtain the transformed image.
Note: You can take the output grid to be 1.5x1.5 times of the input. Only consider the positive quadrant. Use the Barbara image given in previous assign and crop it to 200x200 (includes origin).

You must show this during demo
- Display joint transformation matrix T   [1]
- Show the mapping of output grid to input grid.   [1]
- show the computation of nearest neighbors, use of bilinear interp and
- output image. Interp should be done using equations as discussed in lecture.   [1]

Q2. In this question you will perform registration. Consider the input image of Q1 as the reference image, output image O as unregistered image, and register O wrt. I. In this case, as you know the transformation T, you do not need to compute it.

- Take the output grid in positive quadrant only. Show the mapping of coordinates for which you need interpolation.   [1]
- Show all necessary steps for bilinear interp. This should be done using equations as discussed in lecture.   [1]
- Registered image should be aligned with original reference image. However, as we are only taking positive quadrant in Q1, we may not see the full image.   [1]

Q3. Histogram matching
Take Barbara as an input image.
a. Find the log transformation of input image.   [.5]
b. Compute the normalized histograms of input and log transformed images.   [.5]
c. Compute the CDF using normalized histograms. Let it be H and G. Note you need to take (L-1) factor into account.   [1]
d. For an input pixel r, find $argmin_s |H(r) - G(s)|$.   [1]
e. Find indices where r occurs in input image and at those indices, replace r with s.   [1]
Show the input image, log transformed image, normalized histograms, and, matched image.

Note that log transformed image will be lighter in appearance and so should be the matched image.