IT523: Digital Image Processing
Lab - 1: Spatial Image transformations

Read Help for: `imread, imshow, uint8, double, imwrite, save, subplot, .* .`

1. Write a MATLAB function `myresize.m` which can scale an input image to any given size (M, N). Use bilinear interpolation for this purpose. Show a couple of results in your report.

2. Write a MATLAB function `myrotate.m` which can rotate an input image at any user specified angle about the center of the image. Show a couple of results in your report, and verify whether rotating an image n times by an angle $\theta = \frac{2\pi}{n}$ for some fixed n, yields the original image or not.

3. Let us assume the following bilinear model of deformation for image registration:

$$x' = ax + by + cxy + d$$
$$y' = ex + fy + gxy + h$$

With the help of the provided MATLAB function `myginput.m` mark out few salient corresponding points on the two images `img1.jpg` and `img2.jpg` given along with this handout. Using these corresponding points, estimate the coefficients in the bilinear deformation model. Apply this deformation to obtain a registered image, either `img1.jpg` on `img2.jpg` or the other way round. Store the feature points in an array (save this in a file `myfeaturepts.mat`), along with the two images, and write a MATLAB function `myimregister.m`, that takes in this data and plots the two images and the registered image. Show the feature points you have used in the two images (`myginput.m` will help), the estimated bilinear model and the registered image in your report.

Submission instructions

1. Write a report with answers, plots and figures (under corresponding question number), only in LaTeX.

2. Name your report as `Id_No_Lab1.pdf`. Submit only a single zip file per group (named `ID_No_Lab1`) containing following files and folder: `myrotate.m`, `myresize.m`, `myfeaturepts.mat`, `myimregister.m` and `Report_IDno` (containing `IDno_Lab1.tex` and other required files for compilation, for example image files.) on `courses.daiict.ac.in`. Email submissions will **not** be accepted under any circumstances.

3. Your report and code should contain names and Id numbers of your group members. In the report title specify what software/language/tool you have used to write codes: MATLAB/C++ OpenCV/C++ CImg/Octave.

4. Do not include codes in the report and comment your code properly.

5. **Submission deadline: 09:00 hrs, Friday,** 19^{th} **January, 2018**. The deadline on the Moodle webpage tends to behaves as a random variable, so make sure you submit well in advance.