Assignment 4

se456/cs456: Computer Vision (Section W1),

CS/SE, SST, UMT

Student's Name:_____ **Student Id:** _____

Total Marks: 200

Note1: Upload the folder (with your ID as its name) containing your code files and assignment report to moodle by the deadline.

Note 2: For Q1, the name of your matlab code file is 'q1.m', for Q2, the name of your matlab code file is 'q2.m' and so on

Note 3: One of the good viewers is Irfanview. Download from http://www.irfanview.com/ or Locally

(You can convert images from other formats to the pgm or ppm format by opening them in Irfanview and then saving them in the desired format)

Note 4: Make sure to use the following code to access each pixel of the image matrix (m1),

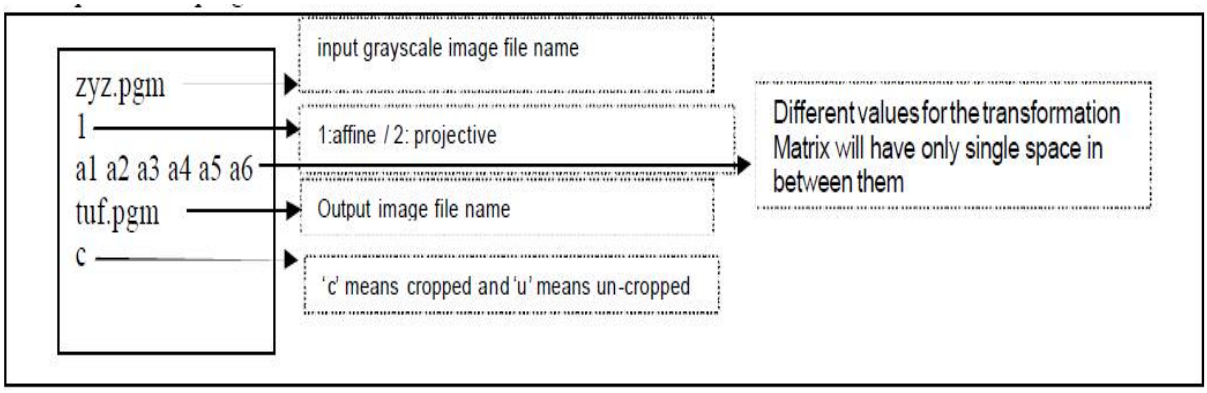
```
for i=1 : row
  for j=1:col
    %im(i,j) is the pixel at ith row and jth column
  end
end
```

Note 5: Rotation means rotation around the center of the object (unless specified). Hence, rotation is not around the center of origin. In order to perform, first translate to origin, then rotation and then translate back.

Note 6: 5% marks are allocated to posting a query in Discussion Forum of LMS or replying a the query that is posted in the Discussion Forum corresponding to this assignment on LMS.

Q1) (140) Implementation of Affine Warping Function

The input to this program will be a file **transform.txt**. Its format is below.



The output of the program will be a .pgm image file (with its name specified above), which will contain a warped version of the original image, which has been transformed according to the given affine parameters or given affine transformations. These affine parameters are given in the file transform.txt. The basic program may generate output that has the same range of coordinates as the input image.

The following results should be given in the report.

Using the image mecca06.pgm, transform it using the following transformations: You can work out the final parameters a1 to a6 on the paper or on the matlab before inputting into the system (the file transform.txt would contains the final parameters a1 to a6). In short, the input to your matlab code is the input image 'mecca06.pgm' and 'transform.txt'. The output of your code would be transformed image (tmecca06.pgm). Your report should contains the input image, transform.txt and the output image for the following transformations (part a to part h). You should also submit input image, transform.txt and output image for each transformation.

a. Shearing of 0.8 on x-axis, followed by a 45° (cc) rotation.

b. 45° (cc) rotation, followed by a shearing of 0.8 on x-axis.

Qs: Do a and b generate the same result? Comment on the differences if any

c. Scaling of 2 in x-direction. Please also write the comment on the output image for this transformation.

d. Scaling of 4 in y-direction. Please also write the comment on the output image for this transformation.

e. Shear of 0.5 in x-direction. Please also write the comment on the output image for this transformation.

f. Shear of 0.5 in y-direction. Please also write the comment on the output image for this transformation.

g. Rotation of 45 degree. Please also write the comment on the output image for this transformation.

h. Rotation of 45 degree followed by translation of 46.3387 in x-direction and -11.8712 in y-direction. Please also write the comment on the output image for this transformation.

Q2) (60) Modify the above program so that the complete transformed image is always visible, i.e. there is no cropping of the transformed image at the corners.

Report: Your project report should contain your matlab code, the explanation of code/algorithm in simple English, input images and output images. Should include results of your program that demonstrate that the program works in all cases. Any implementation issues should be highlighted. For example, how did you take the inverse? What data-structures were used? By reading the report, all the details of your implementation should become clear. This report carries 25% weight in the total score, and is the primary document used during grading.

If you have discussed (only discussed not copied) your assignment with any other student, then write the name of your discussion partner at the top of your report. The template of the assignment report is also uploaded with this assignment.