

All programming required for this project has to be done in MATLAB.

Each student will submit a PDF report named **P1-2YourRollNo.PDF** and a zipped folder containing code for each section named **P1-2YourRollNo.zip**.

The last page of PDF should also explain how to execute your code. All submissions are to be made to TA before the deadline at soofia.mirza@hotmail.com. After the deadline, 30 percent of the project's points will be lost with each passing day, for up to 3 days.

1 Introduction

This assignment deals with projective distortion in camera images and with estimating homographies between images. You are given two images, Figures 1a and 1b, and your homework involves merging the two in the manner described below. In case you did not know, Figure 1b is a photo of Audrey Hepburn, one of the most famous movie stars of the last century.



Figure 1

Tasks:

1. You are supposed to create an image such that the face in Figure 1b is now placed inside the indicated frame PQRS.

(i) For this purpose, you have to calculate the Homography between Figure 1b and the frame PQRS. Show this Homography and your correspondence points used to calculate this Homography.

(ii) Project the image in Figure 1b onto the frame PQRS using this Homography.



(a)

(b)

Figure 2

2. Figure 2a (attached as FAST_lhr.jpg) shows an image of your campus with an advertisement of SOFTEC on one of the buildings. Create an image such that the image WhiteKnight.jpg is now advertised instead of the SOFTEC banner.

(i) Calculate the Homography and correspondence points needed to perform this.

(ii) Apply this Homography to produce the resultant image.

3. Show the same process on your own pair of images where one image can contain any frame and the other image can be face of any individual.

4. Consider the two lines $x+2y+1=0$ and $3x+6y-2=0$. What is the special relationship between these two lines in the Euclidean plane? What are the homogenous representations of these two lines and their point of intersection in homogenous coordinates? What is such a point called?

2.1 Notes

1. To project the face from 1b into the frame, you can draw a bounding box around the face and compute the Homography between the corresponding points. However using just four points for computing homographies might yield poor results. Hence you can use the perpendicular bisectors of the bounding box to obtain additional points in order to compute the Homography. Refer Figure 2.



Figure 2

2. You can use any image editor such as GIMP to determine the pixel coordinate values in the image.