

CPSC 635

Assignment 4: Image Registration

The goal of this assignment is to re-sample a set of image so that they are in a common coordinate system, i.e., register the images. You can display the re-sampled images in their original size, or alternatively, you can display the images together in a larger image called a mosaic.

1 The Data

There are two sets of data that go with this assignment.

The first set contains two images showing a bunch of books on the floor of my office. I took the images with a digital camera and changed my point of view slightly between the two shots.

The second set contains 7 images of the *Spruce Goose* taken from a hand-held camera at the Evergreen Aviation Museum in McMinnville, OR. The focal point is nearly stationary and so the images can be registered to create a panoramic mosaic.

2 The Registration Process

Start with the two book images. This example is small enough that you can do the registration manually. Find a set of easy-to-identify points that are visible in both images. Record the (x, y) coordinates of these points in each image. Once you have done that, you have enough data to compute an affine or projective homography between the two images. You may do this manually, or use SIFT or SURF features. Then use the homography that you compute, along with the **resample** function that is provided, to warp the second image into the coordinate space of the first. Display the images in such a way that you can see that the images are registered correctly.

Repeat the process with the *Spruce Goose* images using SIFT or SURF. I created the panoramic mosaic in Figure 1 using four hand-selected points per homography. It is a tedious process, which is why I used the minimum number of points. Alternately, you can use a Harris corner detector to find points of interest and a variation on the RANSAC algorithm (covered in your text, Peter Kovesi's web site has a good implementation - link on course web site) to compute the homographies.

3 Hand In

Hand in the following:

1. your code for the registration of each of the image sets.
2. the images you produce that demonstrate the quality of your registration.
3. a description and explanation of any salient observations you make related to this assignment.

You will be graded on the quality of your code, the registered images, and your observations.

Cite your sources

You may use code that you find on line, but you must cite all sources fully. Also, it is your responsibility to use anything you find online correctly. I recommend Peter Kovesi's site, <http://www.peterkovesi.com/matlabfns/index.html>, as an excellent starting point.

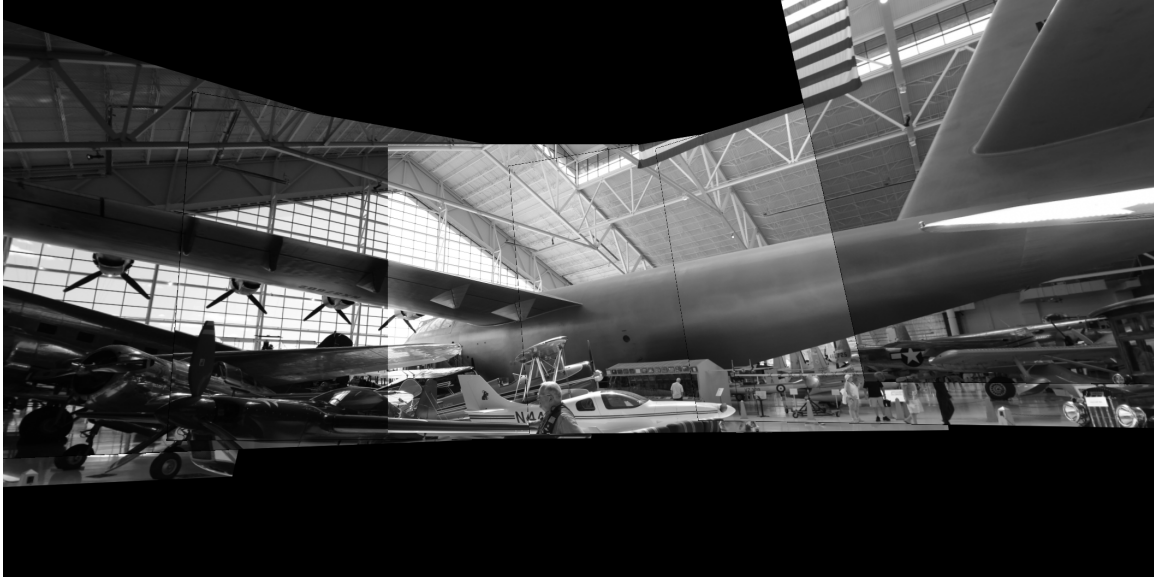


Figure 1: A panoramic mosaic of the *Spruce Goose*.

4 Something Else to Try

I have never done it, but if you care to try, a better way to stitch the *Spruce Goose* images together is to use a cylindrical projection. If you have the time and care to figure it out, it will be rewarded with bonus marks.