CPSC 535
Assignment 7: 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.

Section 11.2 of Sonka, Hlavac and Boyle covers the relevant information on homographies.

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 McMinville, 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. 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.

Now find a set of *interesting* points in each image using a Harris corner detector. Compare these points to the ones you chose for registration. Are they better, worse, same, different? Explain.

Repeat the process with the second set of images. I created the panoramic mosic 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. Alternatevely, 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.

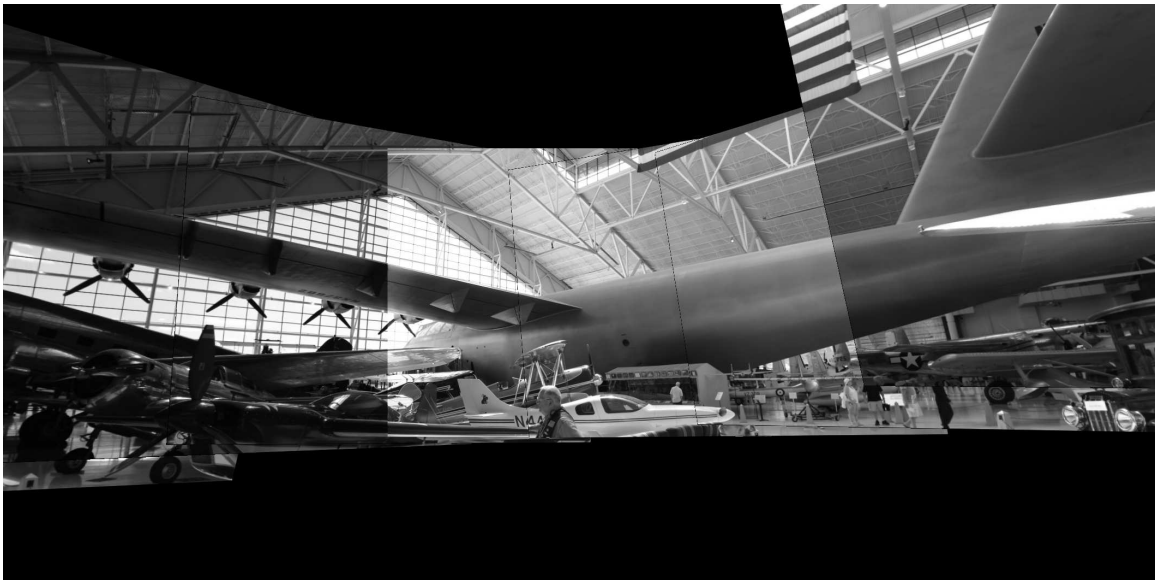   You will be graded on the quality of your code, the registered images, and your observations.

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