

**CSci 4968 and 6270**  
**Computational Vision,**  
**Fall Semester, 2009-2010**  
**Homework 4**  
**Due: Friday, October 30, 2009, 5 pm**

This assignment is worth 75 points toward your homework grade.

You are to implement a two-image matching and mosaicking algorithm based on SIFT keypoint matching and estimation of the inter-image transformation. Students in CSCI 4968 are only required to implement the affine transformation model, while students in CSCI 6270 must use the homography (and therefore get better montages).

The input parameters to your function should be two color images. The output parameters should be (a) the image created as the mosaic between the two images, and (b) as the 3x3 transformation matrix that maps the first image,  $I_1$ , onto the second image,  $I_2$ . The name of your function should be `hw4match`. This function should also create a display that shows which keypoints from  $I_1$  match to which keypoints from  $I_2$ . Keypoints that do not match should not be shown.

You may use your own SIFT implementation, but instead I recommend that you download the SIFT code from

<http://www.vlfeat.org/~vedaldi/code/sift.html>

This will require compilation in Matlab; instructions are available on-line. You may use this code for keypoint detection and matching. You must implement the remainder of the algorithm yourself.

In particular, you must implement

- the random-sampling technique to determine which keypoints are correct matches,
- the estimation technique for determining the final transformation between images, and
- the inter-image mapping technique for creating the final montage.

All of these are described in the Lecture 13 notes that are available on-line and will be discussed starting Thursday.

Extra credit will be given for

- code that can automatically determine when two images should not be aligned, and
- code that generates a smooth blend between the images.