

# CS268: MACHINE PERCEPTION

## Lab 2

Due according to schedule on website

This assignment is meant to help you familiarize with rigid, affine, projective transformations as well as with linear, least-squares estimation.

Download from the class website the 6 photographs of the UCLA campus. The goal is to build a composite mosaic. A mosaic is an image, larger than each of the original images, built by stitching together a number of images. In order to generate a mosaic, you will need to understand the transformation induced from one image to another by the motion of the camera.

- What are the conditions (i.e. camera motion and/or scen structure) under which the transformation mapping one image onto the other is linear?
- What are the conditions under which the transformation is affine?
- What are the conditions under which the transformation is projective?
- What are the conditions under which the transformation cannot be described by a finite-dimensional map?

Once you have familiarized yourself with these conditions, write an algorithm that will take as input two images, and return a composite mosaic (another image) together with a score that quantifies how well the transformation you have designed approximates the actual map between the two images.

Turn in a printout of matlab code that obeys the syntax `[mosaic, score] = buildmosaic(image1, image2, transformation)` where “transformation” is a string that can either be “euclidean”, “affine” or “projective.”

At this stage, your program can be interactive, that is you can solicit user input to help you build the mosaic. To this end, you may find the function `clickimage.m`, available for download from the website, useful.

Test your code on all combinations of pairs of images you have downloaded.

- What pairs of images give you a high score (bad matching)?
- What pairs give a low score?
- Run your code recursively to build a multiple-image mosaic, by putting together cleverly pairs that give low score.

Return a printout of your best multi-frame mosaic.