

# CS 322 Project 1: Notes on Image Alignment in MATLAB

When scanning an image or taking a picture with a digital camera, it can sometimes be difficult to get the image aligned exactly how you want it. For those of you who want to try using MATLAB's fairly extensive image transformation, you can use the **cpselect()** function, which is actually a GUI application that allows you to map control points between two images and generate a transformation that maps the control points on the first image to the control points on the second image. Since we want our chart to be axis-aligned, you can use the **checkerboard()** function to generate a checkerboard pattern to align against: take the four corners of the chart to the four corners of the checkerboard (to make it easy, you should make the checkerboard have a large number of pixels per checkerboard square – check the MATLAB help for details on how to do this). In addition, **cpselect()** expects a 2-D array, and your image is a 3-D array (width, height, and color channels). To fix this, you can use indexing to select only one of the three channels (for instance, green) and then use the **squeeze()** command to remove the singleton dimension. When you have chosen the control points in **cpselect()**, you should go to File — Save Points to Workspace, and make sure "Structure with All Points" is checked.

Now that you have the control points, you can use **cp2tform()** to take the *cpstruct* object you created with **cpselect()** and create a *projective* transform (you should pass the argument 'projective' along with the *cpstruct* object). Once you have the transform object, you can then use **imtransform()** to apply the transformation to the image. You can also pass additional arguments to **imtransform()** to crop your image to the boundaries of the control points.