METR4202 -- Robotics
Tutorial 7 – Week 7: Image formation and features

Reading
Review Matlab’s documentation on the image processing toolbox

Try:
- `doc imread`
- `doc imshow`
- `doc rgb2gray`
- `doc imtool`

Questions
Pick two random numbers from 1-25. Given this to the group next to you. Using the random values given to you from the neighboring group, perform a Google Images search for a soda can (of a brand of your choosing). Take the Nth images based on the random number given.

1. Load the provided picture (of a house) and the can images into Matlab, using the image toolbox.
   (hint: try `doc imread`)

2. Perform a Canny edge detection on the newly loaded image (hint try `doc edge`).
   Try varying the T and sigma values to a better result. Your output should look something similar to below.
3. Perform a Hough transform on the canny edge results from part 2.
   • Try doc hough
   • Find a reasonable number of peaks in your Hough transform results using houghpeaks
   • Use these peaks with houghlines to produce a line plot of the original image.

4. Resize and rotate the image using the following code snippets
   (This is illustrated in the “ipexrotate” example (showdemo ipexrotate))

   \[ \text{I} = \text{imread('<filename here>');} \]
   \[ \text{imshow(I);} \]
   \[ \text{scale} = \#\#; \]
   \[ \text{J} = \text{imresize(I, scale);} \% \text{Try varying the scale factor} \]
   \[ \text{theta} = \#\#; \]
   \[ \text{K} = \text{imrotate(J, theta);} \% \text{Try varying the angle, theta.} \]
   \[ \text{figure, imshow(K)} \]

Now explore using cp2tform to infer spatial transformation from control point pairs selected on the object (doc cp2tform)