Question 1: Finding Circular Things with the Hough Transform

Your task is to complete two functions: houghTransformLines and findHoughMaxima. We already discussed this topic in class: The Hough transform can be used to detect contours of any shape. An easy shape to deal with in terms of programming is the circle. Your task is to modify the netpbm_hough.c code so that it detects circles of any (reasonable) size and location in a given input image. As we figured out in class, this requires the estimation of three parameters: the vertical and horizontal positions of the circle center and the radius of the circle. Therefore, you will have to use a three-dimensional output space for the modified Hough transform. You should define your own data type for this purpose; basically, it will be a three-dimensional array.

The output space should be of reasonable size, otherwise computation could take a long time. Please find a nice test image that contains some near-perfect circles. The desk.ppm image attached in this assignment may work but is probably not ideal. Let your algorithm detect as many circles as there are in the image, and submit your code, the input image, the Hough-transformed image with marked maxima, and the input image with the detected circles being marked. To visualize the Hough-transformed image, you can simply show a 2D projection. The easiest and most illustrative way to do this may be to simply ignore the radius parameter and just show the two-dimensional space spanned by the vertical and horizontal circle center positions.

Submitting Information:

- You can still use the code I provided
- You should have all code in one file
- Submit your code and all images on Canvas.
- Deadline Dec Oct 22th at 6:00PM