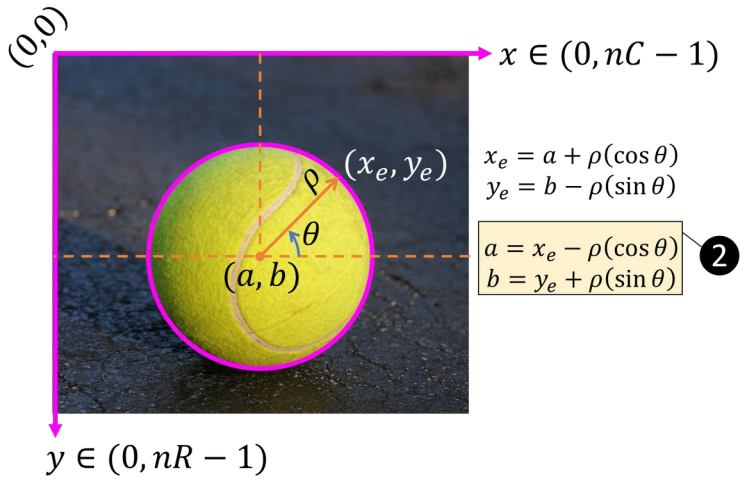
EE420 – Digital Image Processing – Homework 5

Deliverables & Questions

1. The MATLAB code is attached to this PDF in a '/code' folder.

2. The expressions for a, b listed in Eq.(2) have different sign for $\rho(\cos\theta)$ and $\rho(\sin\theta)$ because the positive angle theta is growing in the negative direction of y. Meaning that y_e is growing in the negative y position. x_e, on the other hand, is growing with x, and there for has a positive sign (according to figure 2):

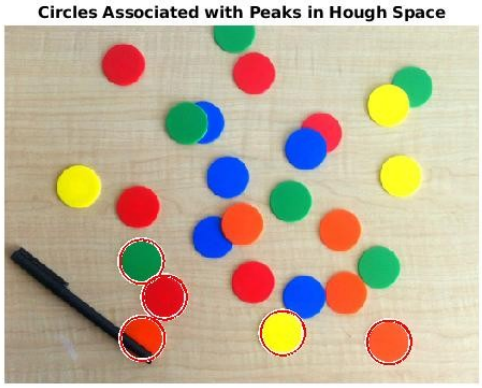


3. My estimate radius of the colored chips was 24. I used the function 'imfindcircles()' of the image to find the radii of all the circles in the image.
   My parameters for the Canny edge detector were [0.05 0.15], and I found there using trial and error – changed the values until I found the best ones.

4. I was able to detect all 28 circles in the image.

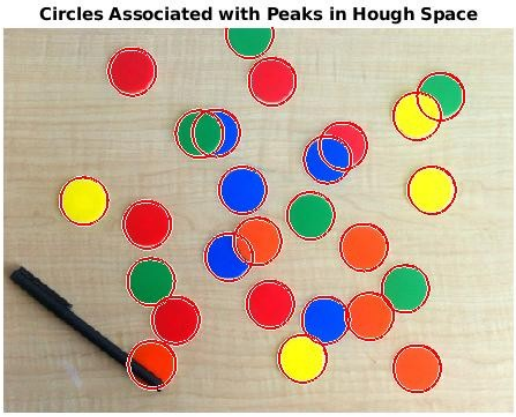
5. When I pick a large value for the threshold in `houghpeaks`, I could detect less circles.

   For example, for threshold = 200, I could only detect 5 circles:



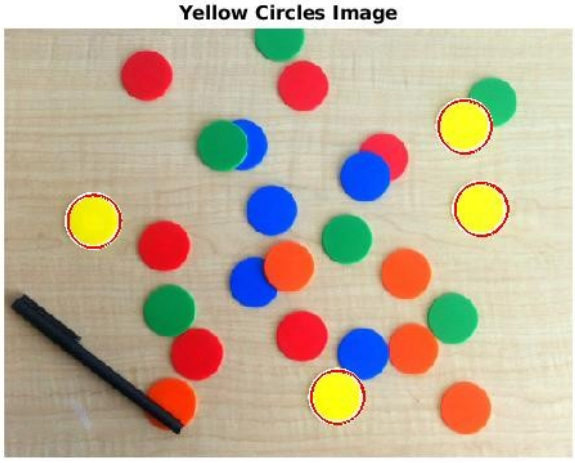
6. When I pick a small value for the threshold in `houghpeaks`, I could detect all of the circles.

   For example, for threshold = 0.0000001:



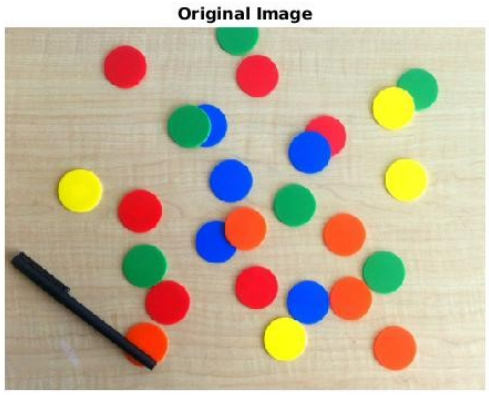
   I think that with such a small threshold, with a different image, the function would recognize other non-circle shapes as circles (in this image there are not a lot of other shapes besides the coins).

7. The yellow coins detected by the code:

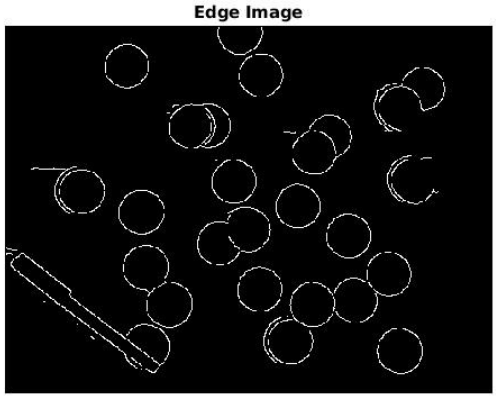


8. Screenshots of the original image, output of Canny edge detector, the Hough Space diagram with the peaks overlaid:

   Original image:



   Output of Canny edge detector:



   Hough Space diagram with the peaks overlaid: