DIP Assignment 3

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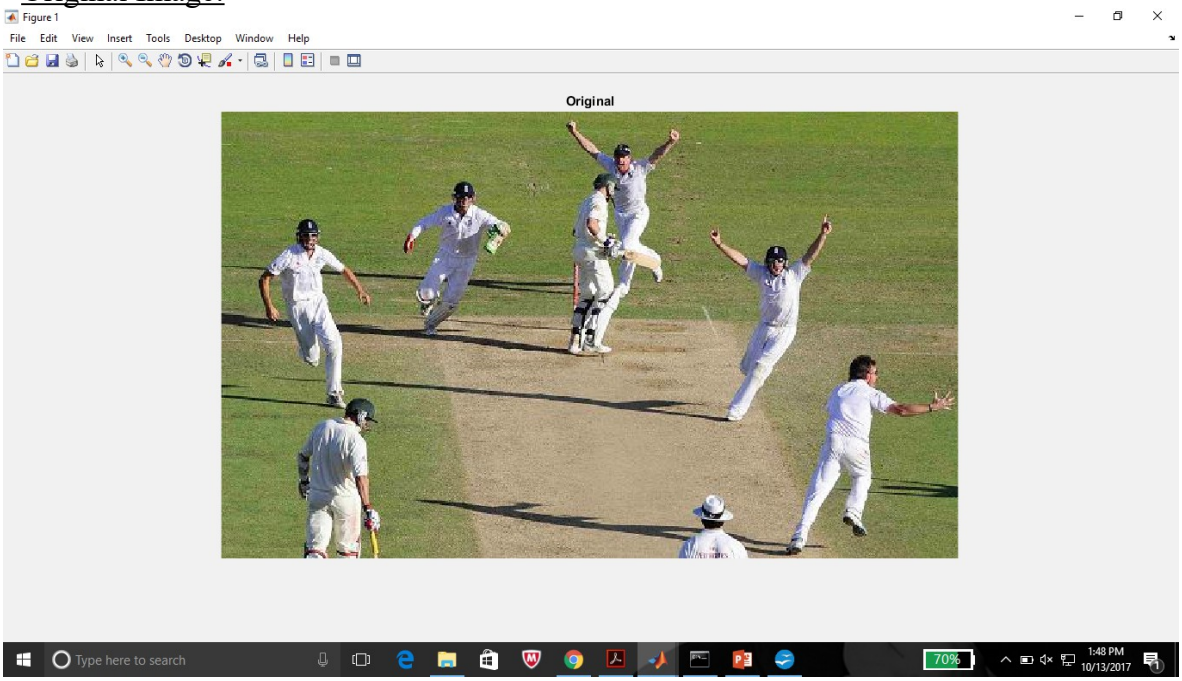
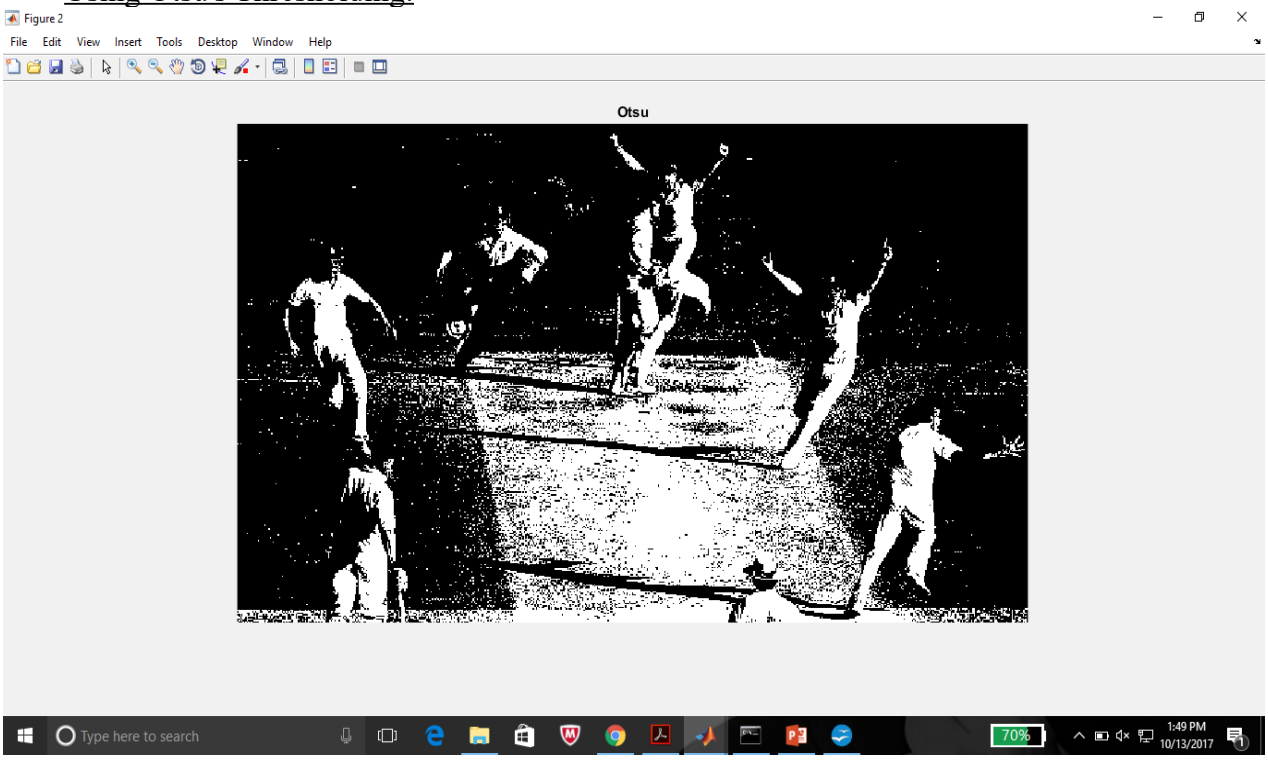
Question 2:

a) Binary image for Cricket1.jpeg

Original Image:



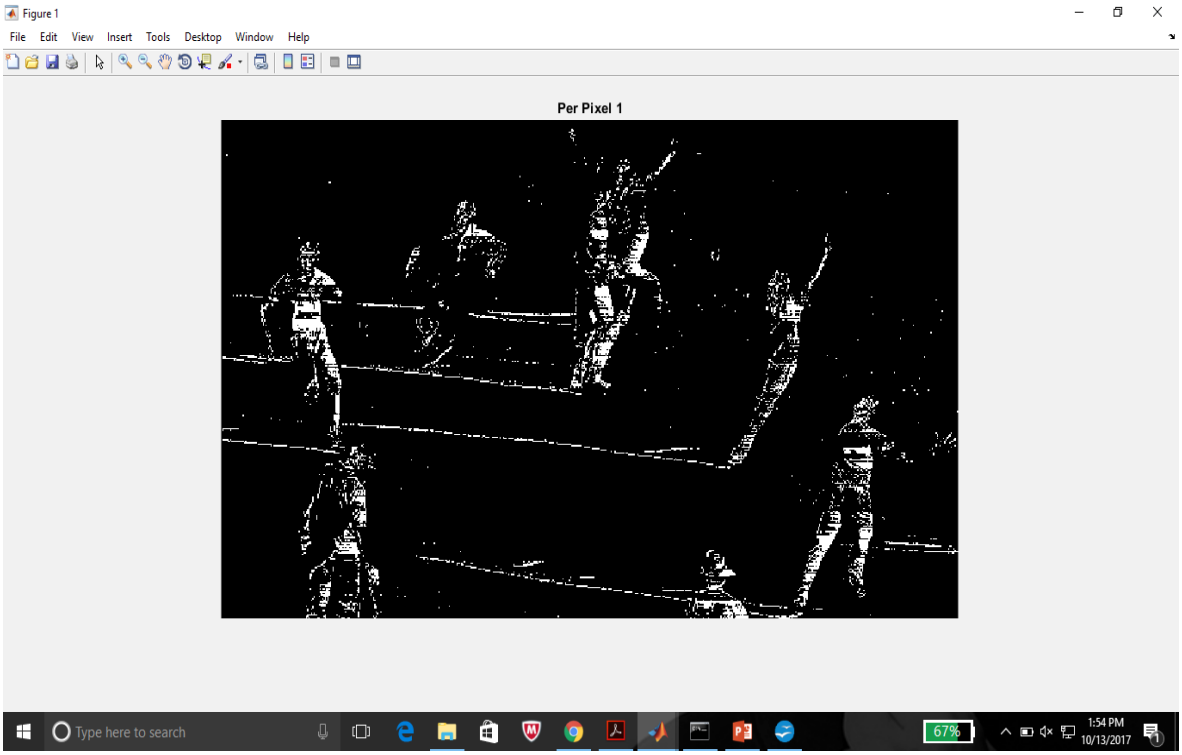
Using Otsu's Thresholding:



Using Per Pixel Variable Thresholding:

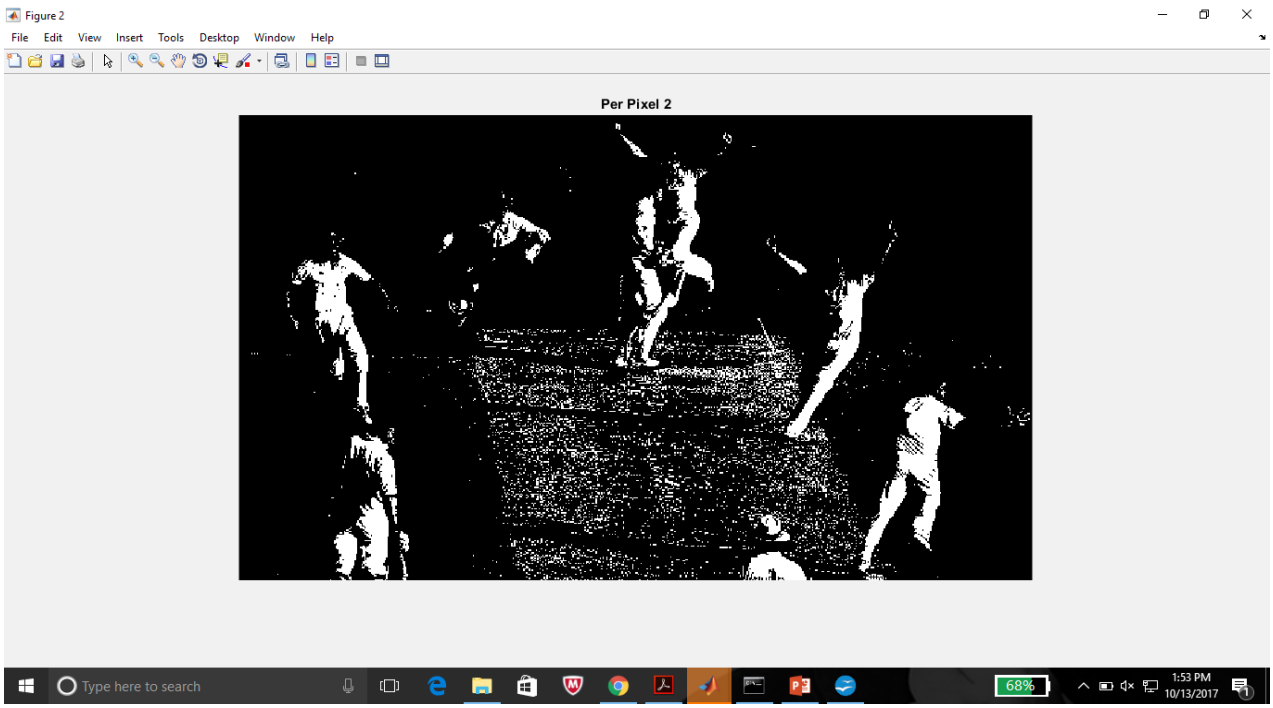
I have used two separate thresholding functions to perform the segmentation. The first thresholding function computes Txy = a*sigma$_{xy}$ + b*m$_{xy}$ where sigma$_{xy}$ and m$_{xy}$ are the variance and mean for the image patch of a particular size. The second thresholding function is Txy = a*sigma$_{xy}$+b*m$_{G}$ where m$_{G}$ is the mean for the entire image (not just a patch). We can see that m$_{xy}$ will vary whereas m$_{G}$ remains constant.

The output image for the first thresholding function is shown below.



Note the lines which are present in the image. These lines are the contribution of the mean of the particular patches since they do not appear in the image which uses the second thresholding function.

The output image for the second thresholding function is shown below.

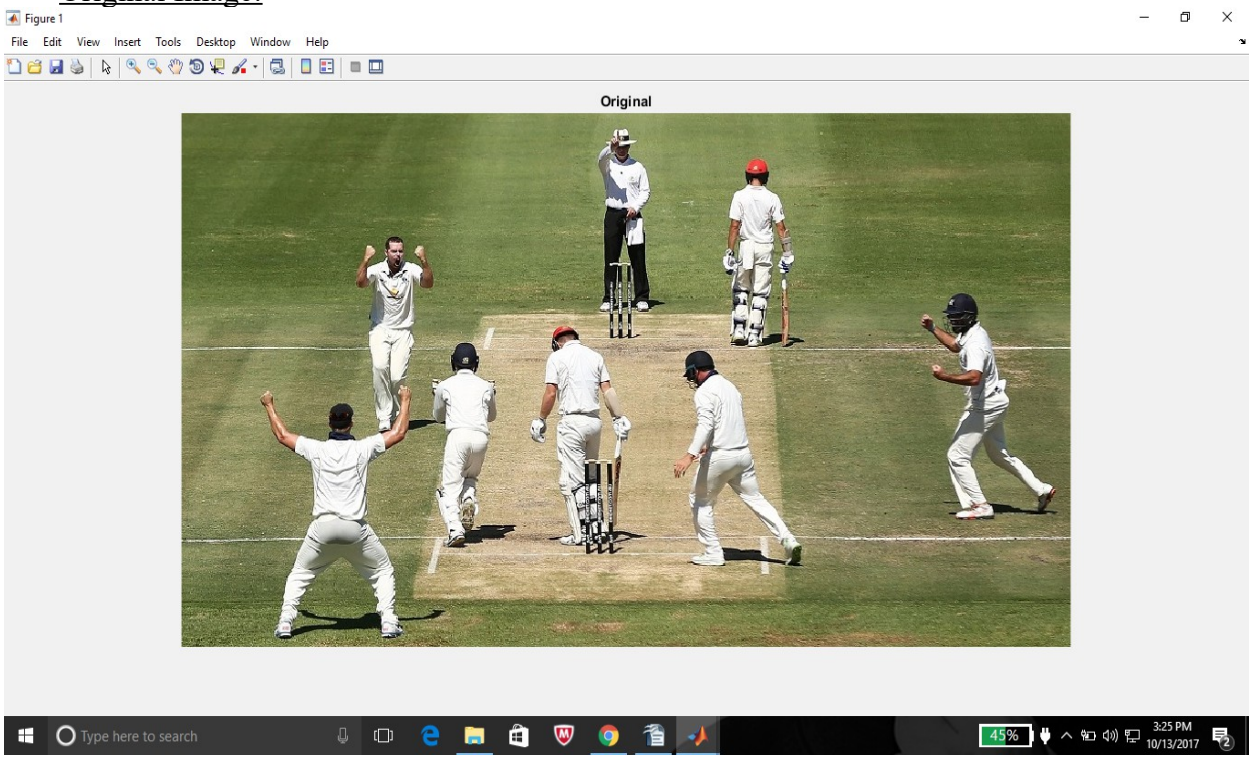


We can see the lines are no longer present in this image but the field is more defined in this image.

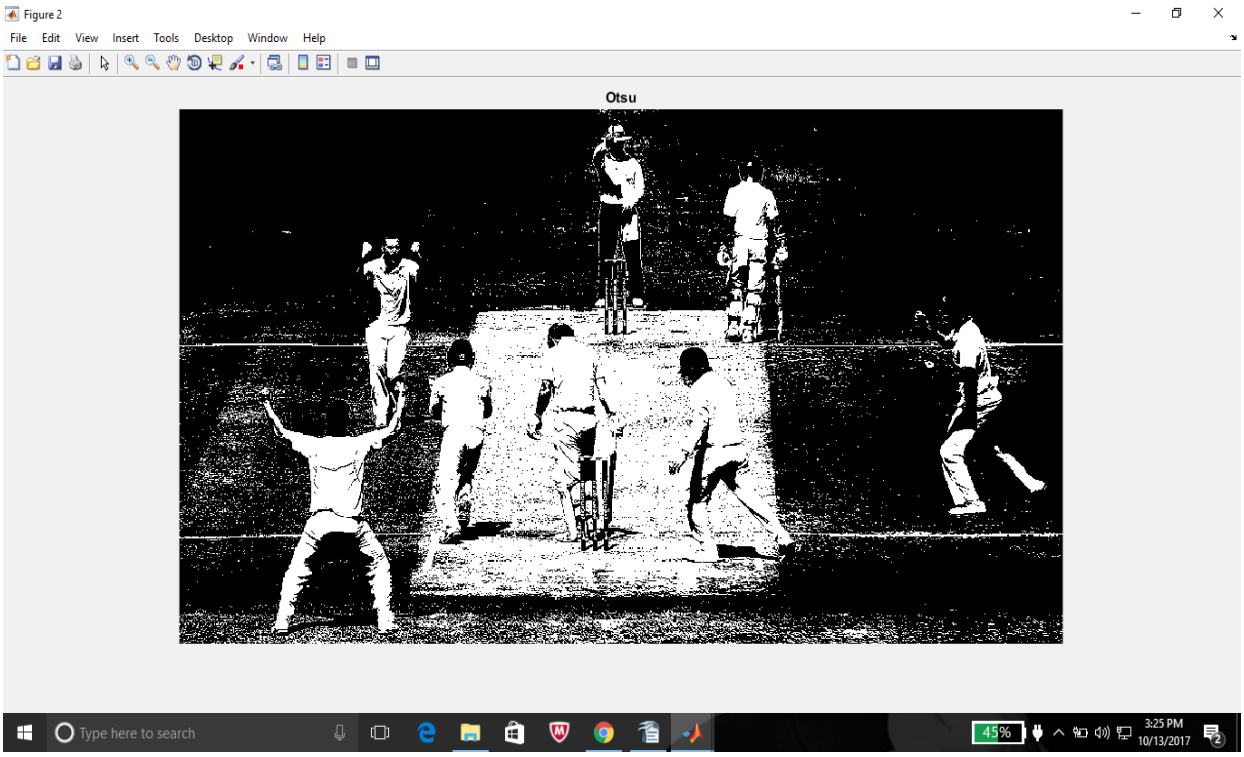
b)

Image 2:

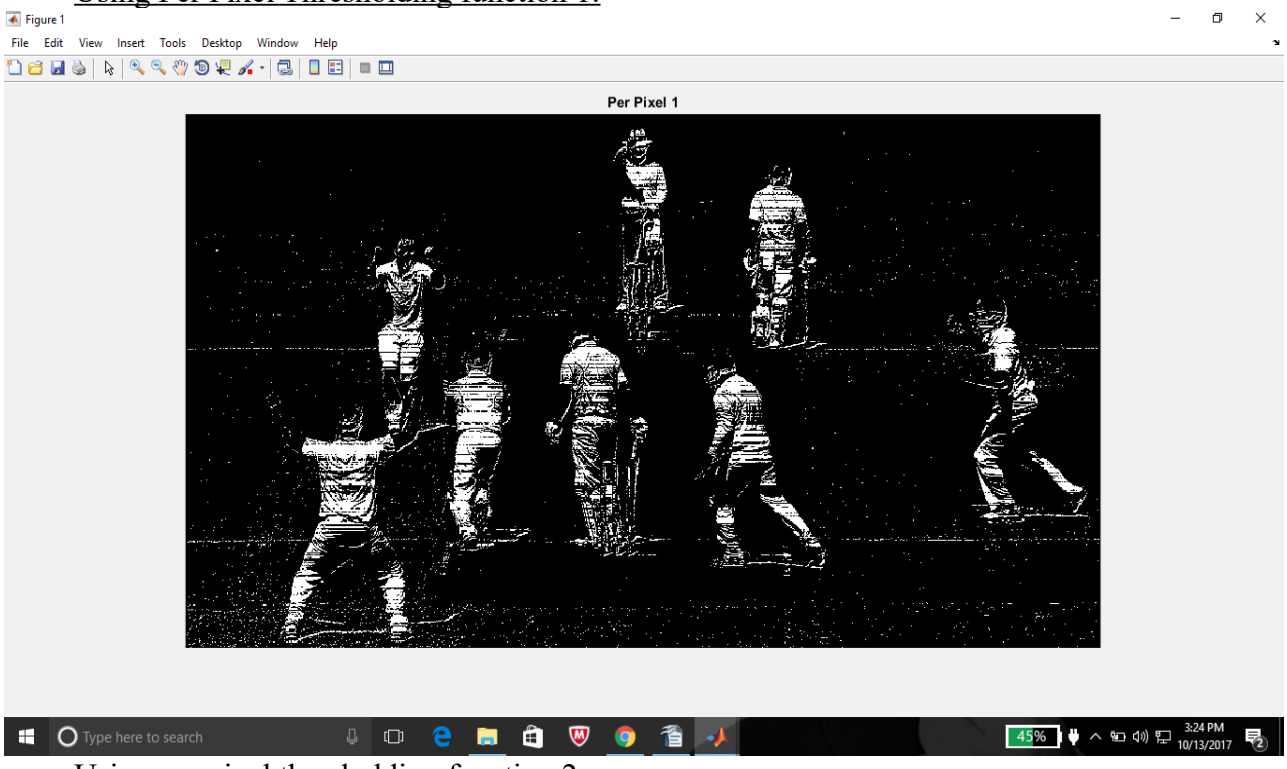
Original Image:



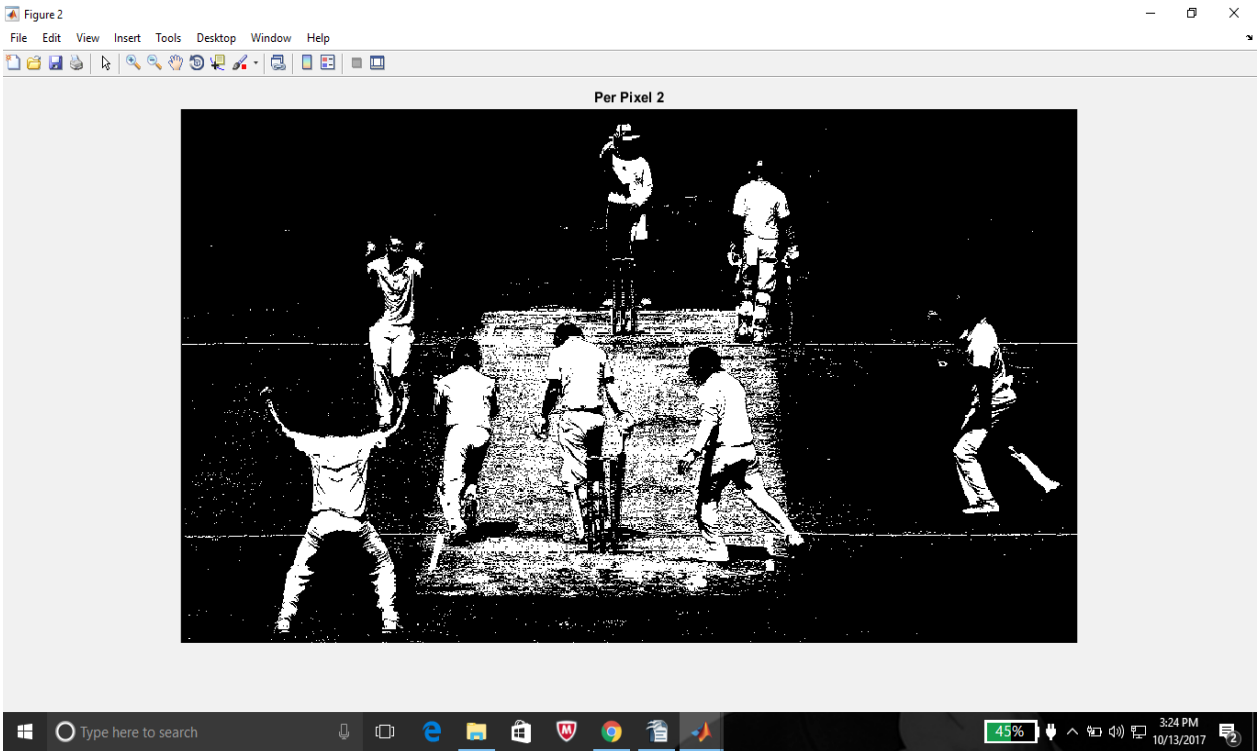
Using Otsu's thresholding:



Using Per Pixel Thresholding function 1:



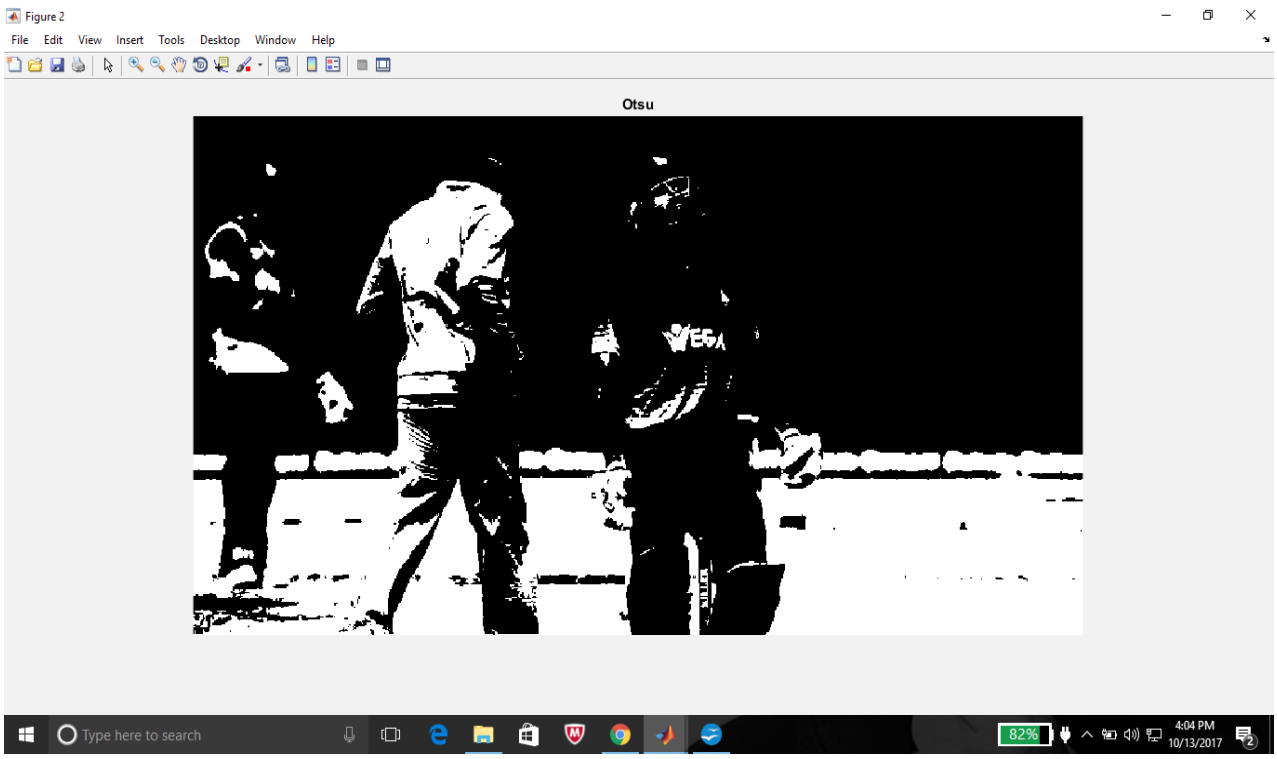
Using per pixel thresholding function 2:



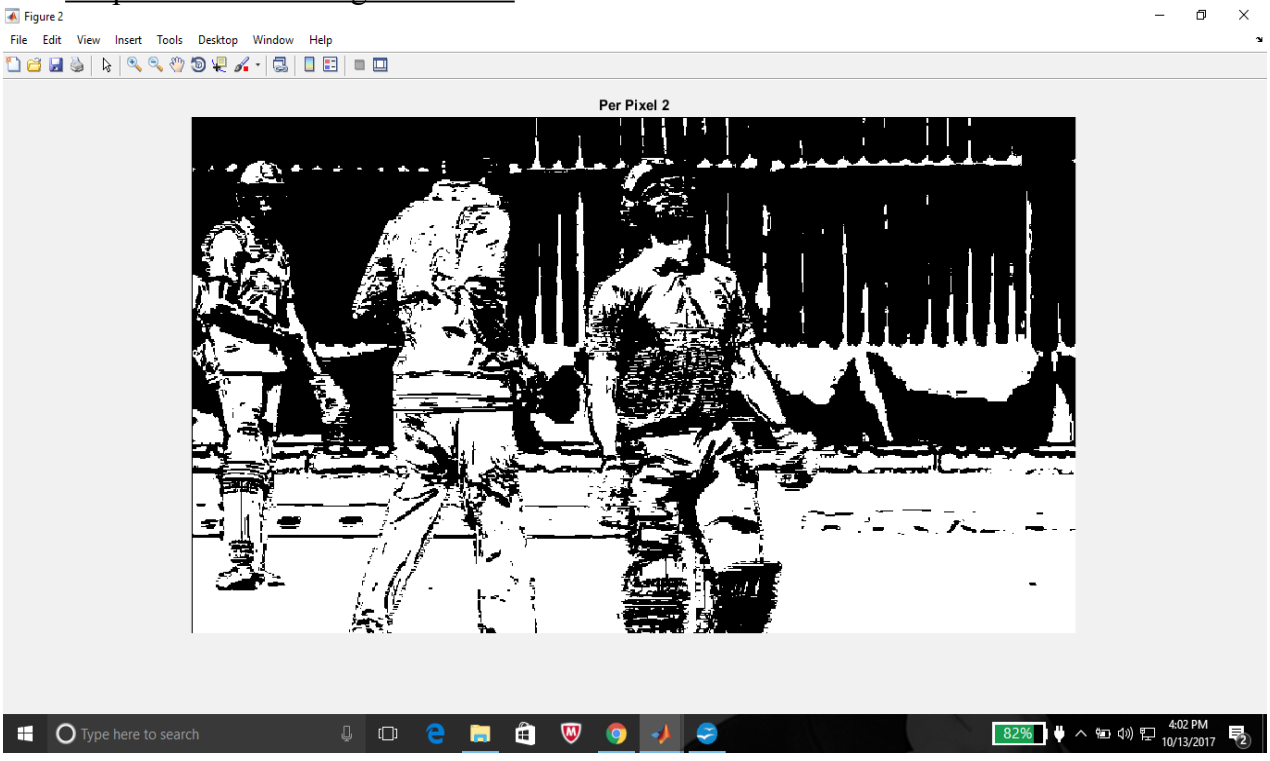
Input Image 3:

Original Image:

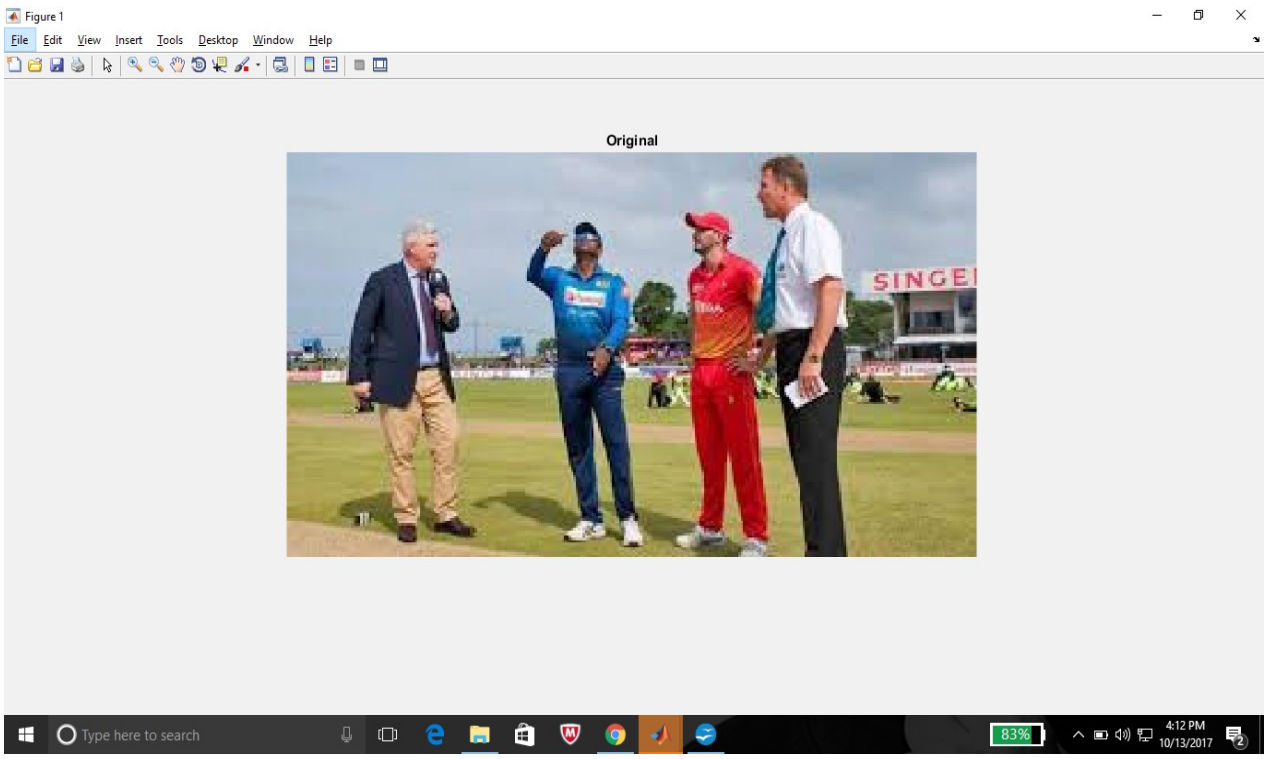
Output for Otsu:



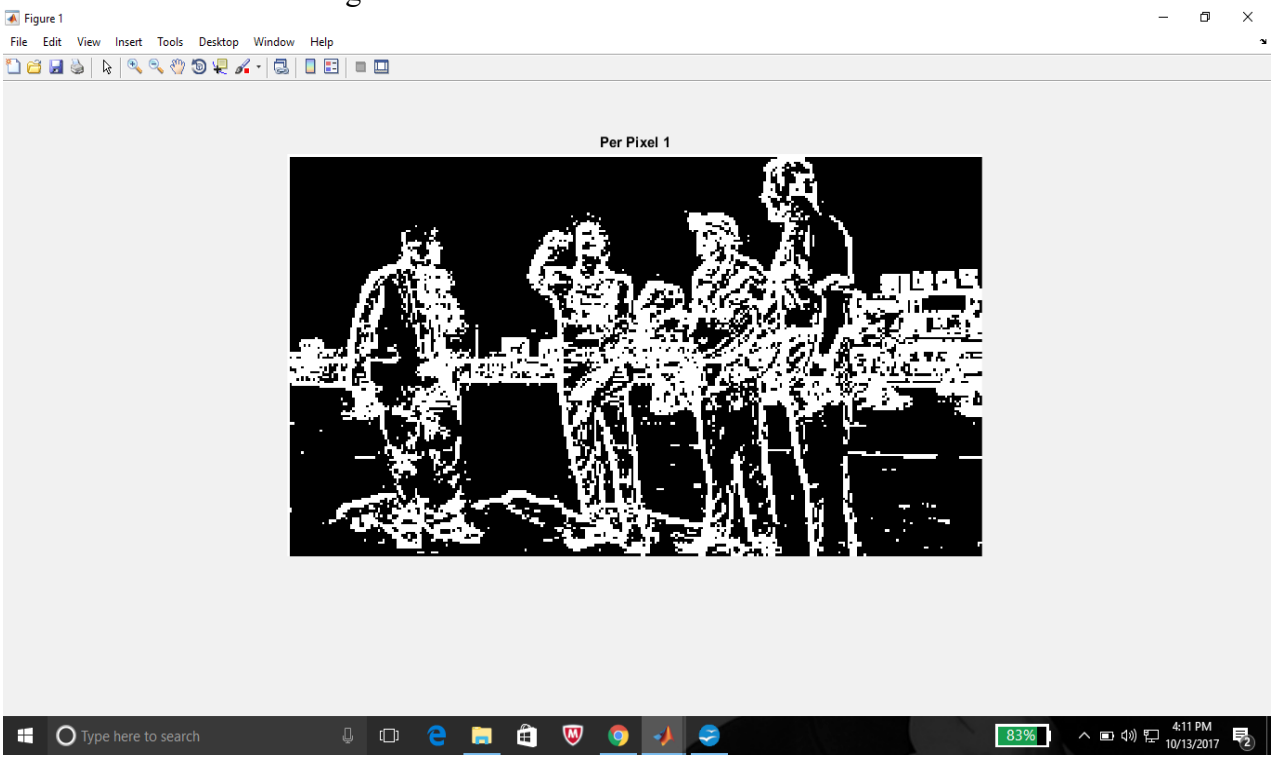
Output for thresholding function 2:



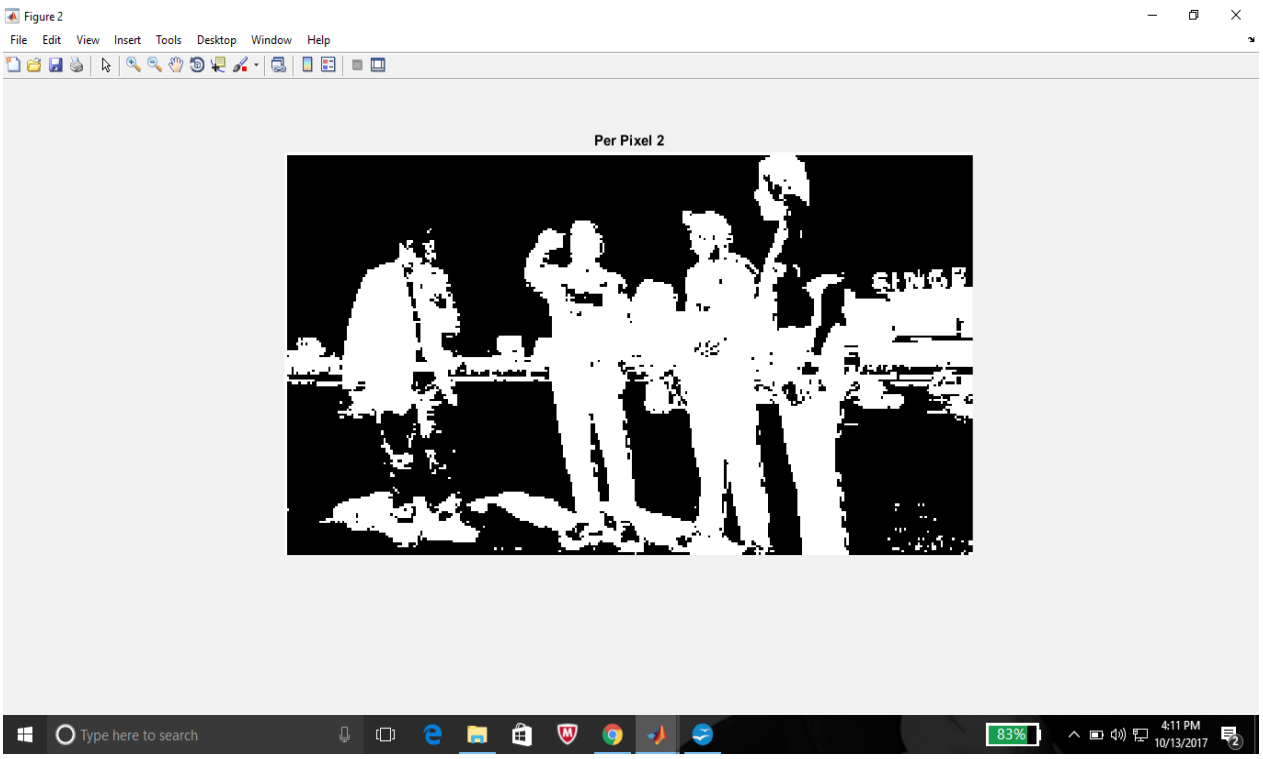
Input Image 4:
Original:



Per Pixel Thresholding function 1:



Per Pixel Thresholding function 2:



Observations:

We can clearly see that the per pixel thresholding with function 2 outperforms the others. This is as Otsu's thresholding is sensitive to illumination and performs poorly in such cases. On the other hand, the function 1 yields white lines in the images which are undesired.

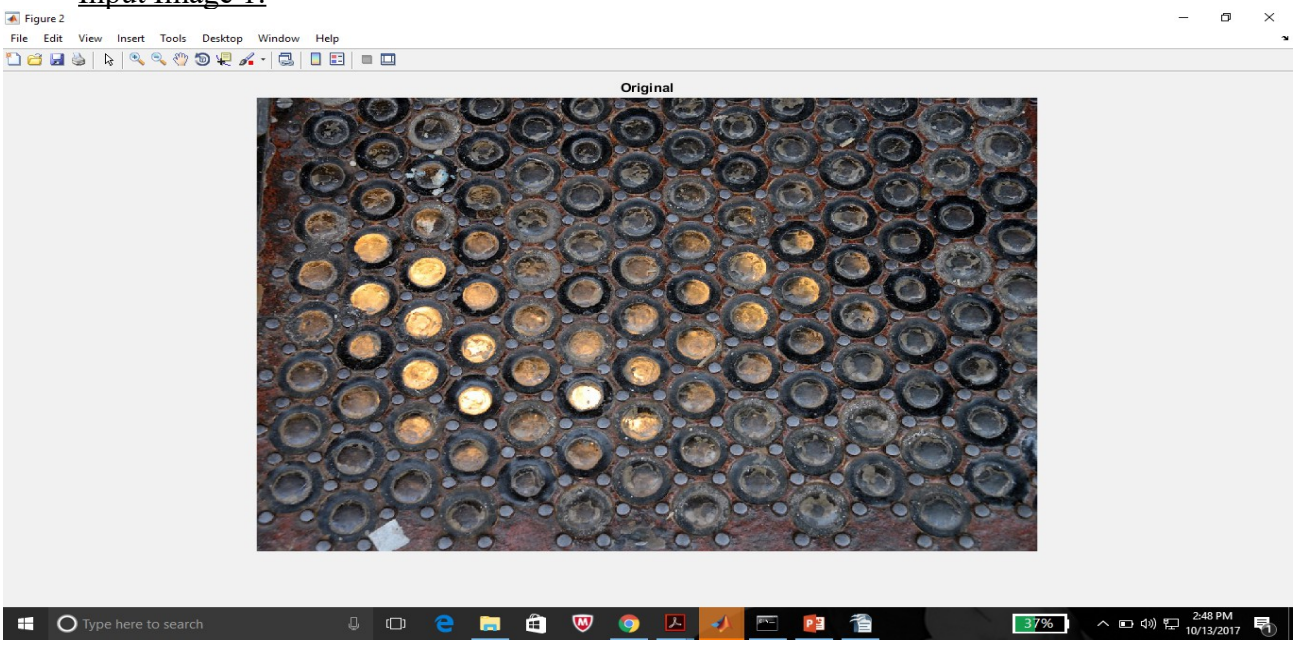
Results:

The thresholding function 2 is preferred.

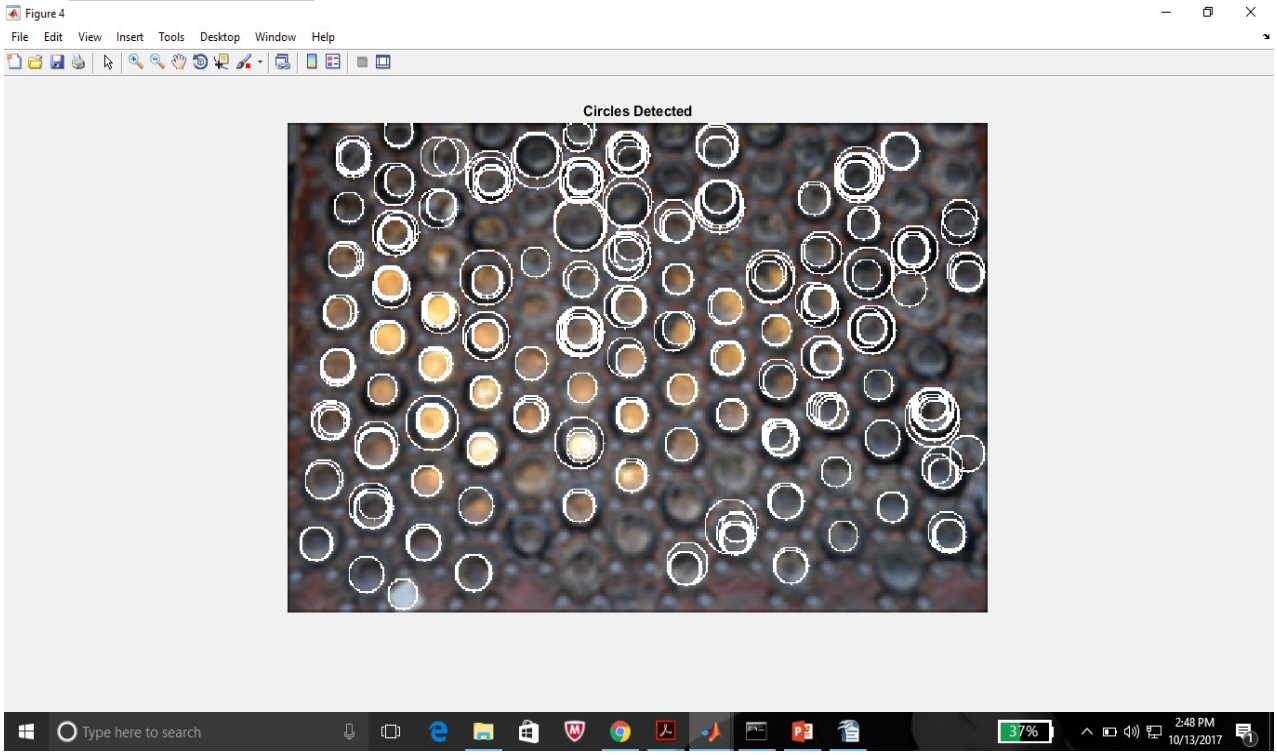
Question 1)

a) **Circles**:

Input Image 1:

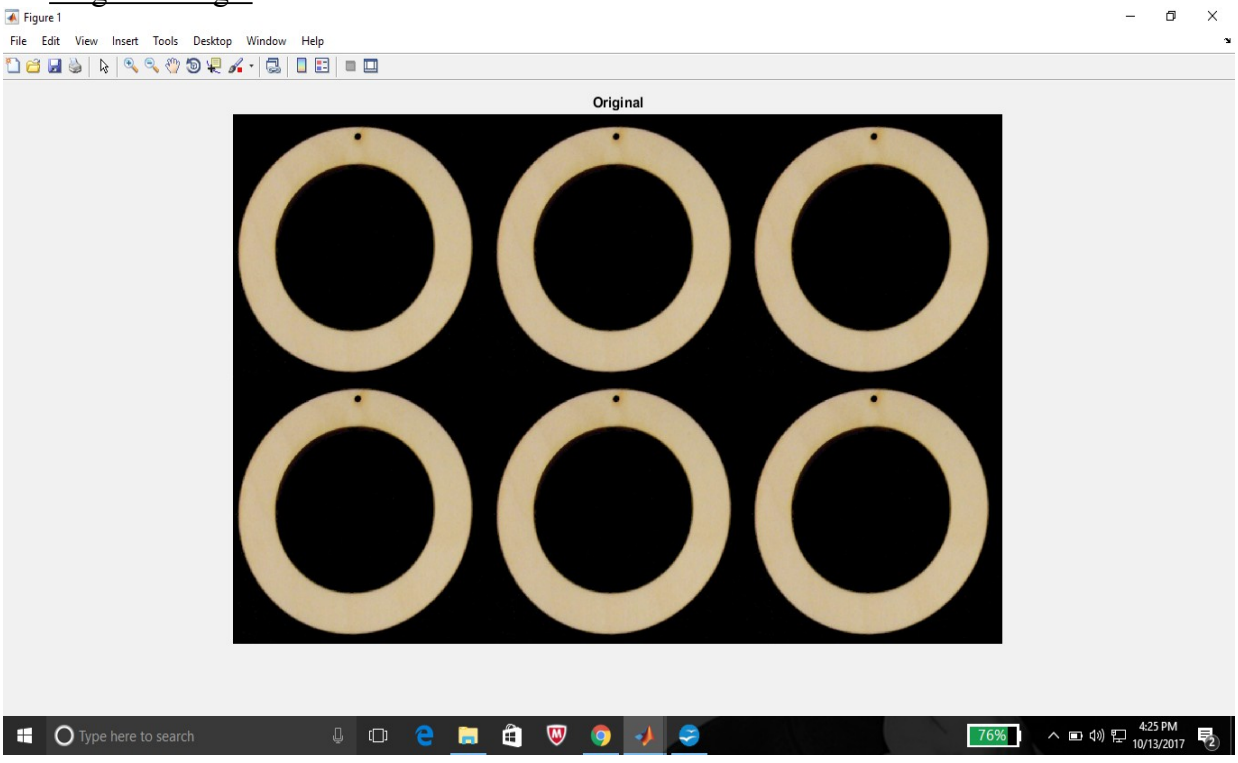


Circles Detected 1:

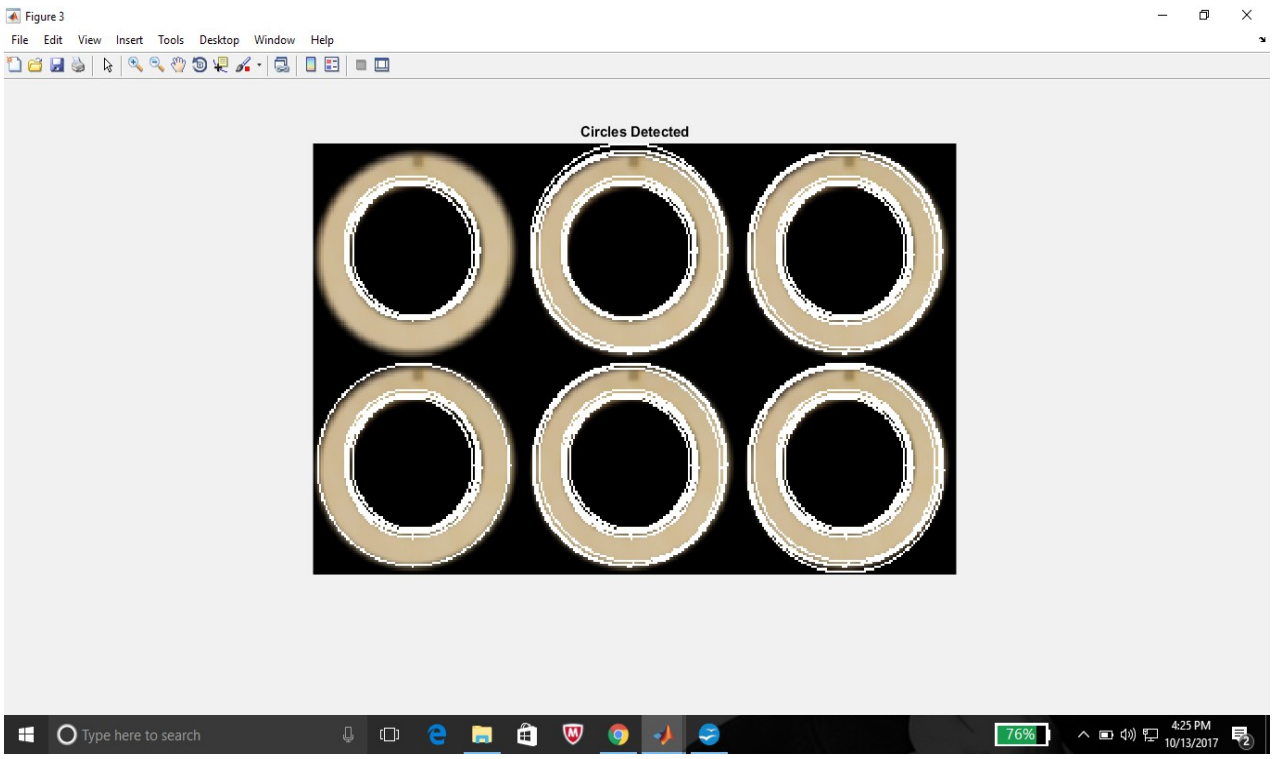


Input Image 2:

Original Image:



Circles Detected:



Input Image 3:
Original Image: