

MACHINE VISION 2020



UNIVERSITY OF
EASTERN FINLAND

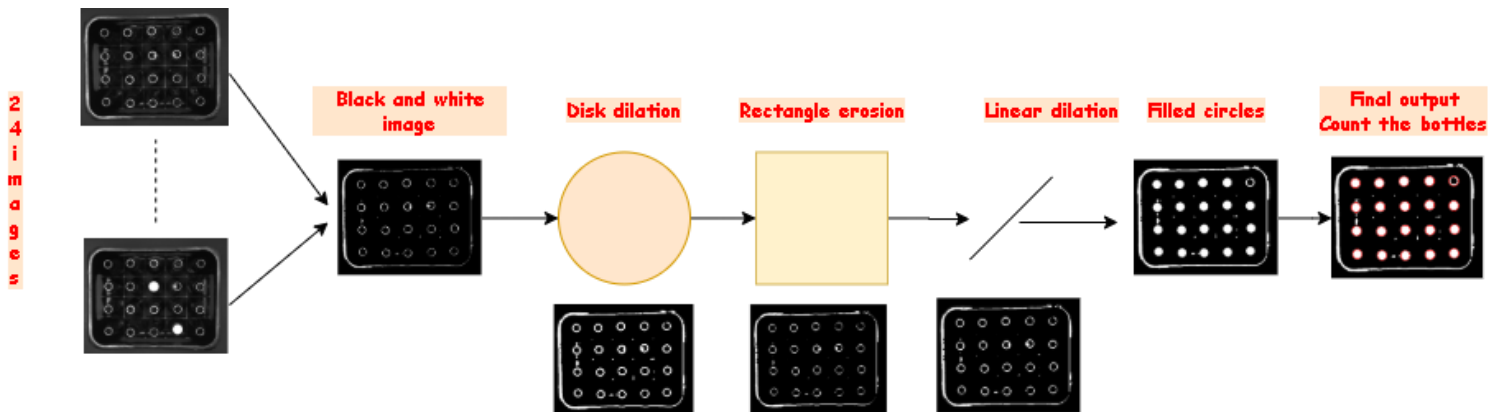
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312843

Home Assignment

Joensuu

Solution



Matlab → Program that I used

`imread()`, `imshow()`, `im2bw()`, `strel()`, `imdilate()`, `imerode()`,
`imfill()`, `imfindcircles()`, `viscircles()` → functions that I used.

Explanotin of program how it works with comments

```

1. %%Taking path of the image that you want to count bottles in crate.
2. path=input("Please enter path of the image: ", 's')
3. fprintf("Your entered this path: %s", path)
4.
5. %%Read the image and show the image.
6. original_image = imread(path);
7. imshow(original_image);
8. %%Convert to image into black and white for processing and show the image.
9. black_and_whiteImage = im2bw(original_image);
10. imshow(black_and_whiteImage);
11.
12. %%Creating a disk-shaped structure element, where radius=2, the number of
13. %%line structuring element=6 for dilation process.
14. SE=strel('disk', 2,6);
15. %%Applying dilation to complete broken circles of the bottle.
16. dilated_image=imdilate(black_and_whiteImage, SE);
17. imshow(dilated_image);
18. %%Creating a rectangle-shaped structure element, where element size of
19. %%[2,5] for erosion the image.
20. SE_2=strel('rectangle', [2,5]);
21. %%Creating a linear structure element, where length=3, angle degree=3 for
22. %%dilate the image.
23. SE_3=strel('line', 3,3);
24. %%Applying erosion to clear white points from the image.
25. eroded_image=imerode(dilated_image, SE_2);
    
```

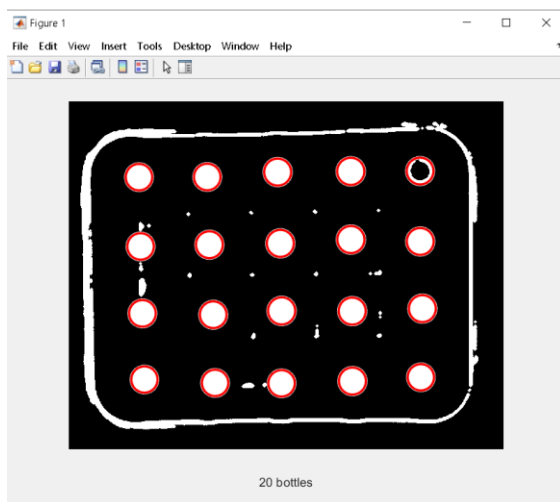
```

26. imshow(eroded_image);
27. dilated_image2=imdilate(eroded_image, SE_3);
28. %imshow(dilated_image2);
29. %%Filling the circles from the bottles to get straight circles.
30. filled_image=imfill(dilated_image, 'holes');
31. imshow(filled_image);
32.
33. %%Finding the circles with HOUGH TRANSFORM with radious range=[18,55]
34. [centers, radii, metric] = imfindcircles(filled_image,[18 55]);
35. %%draws circles with specified centers and radii onto the current axes.
36. h = viscircles(centers,radii);
37. xlabel([num2str(numel(radii)), ' bottles']);

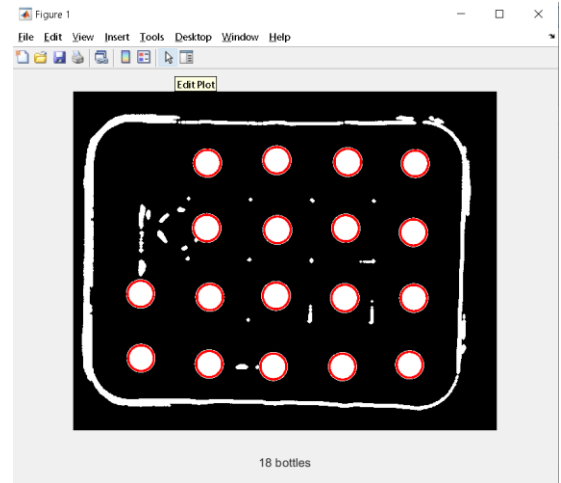
```

Program outputs

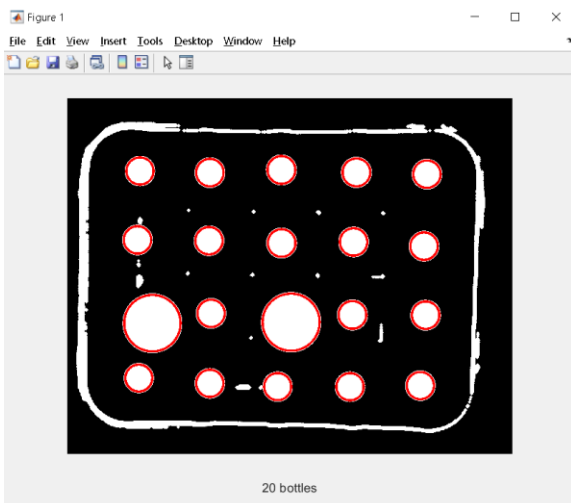
bottle_crate_01.png



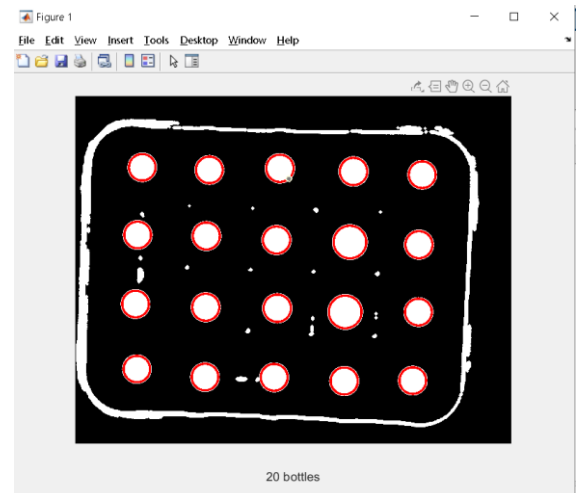
bottle_crate_02.png



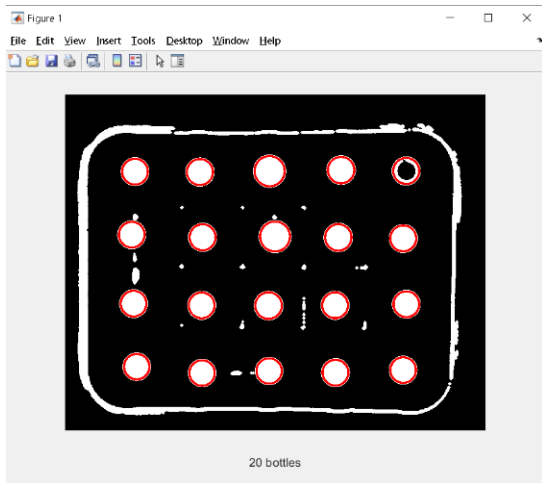
bottle_crate_03.png



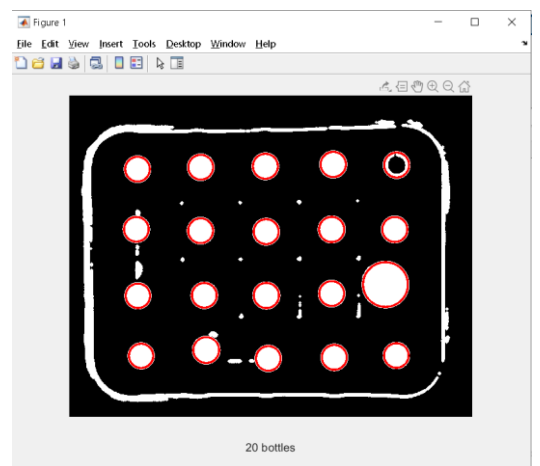
bottle_crate_04.png



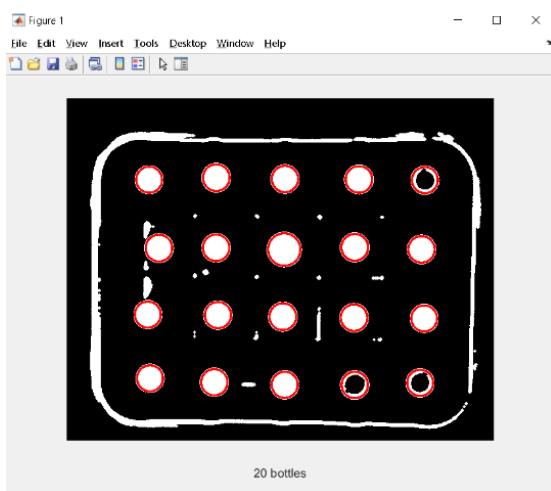
bottle_crate_05.png



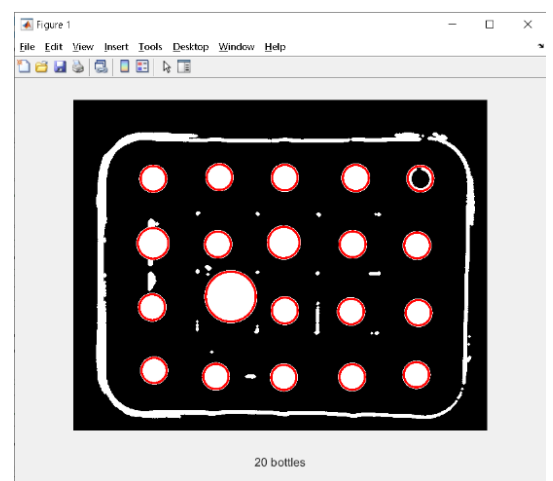
bottle_crate_06.png



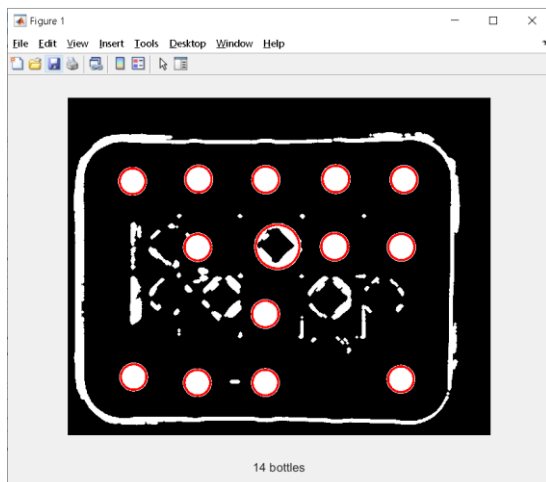
bottle_crate_07.png



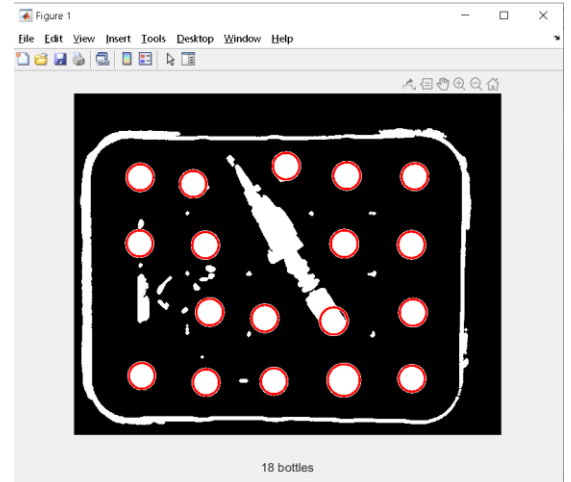
bottle_crate_08.png



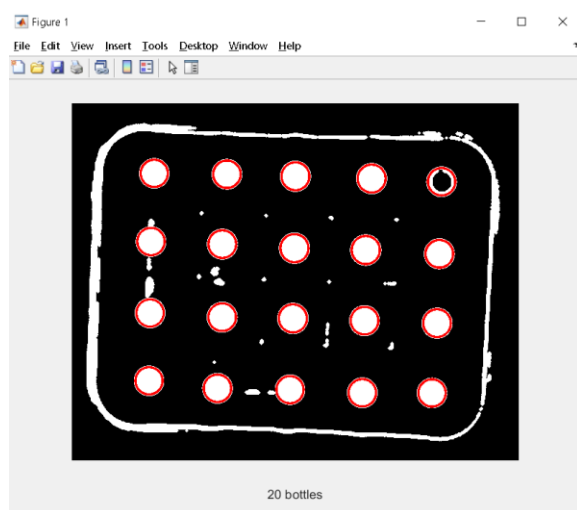
bottle_crate_09.png



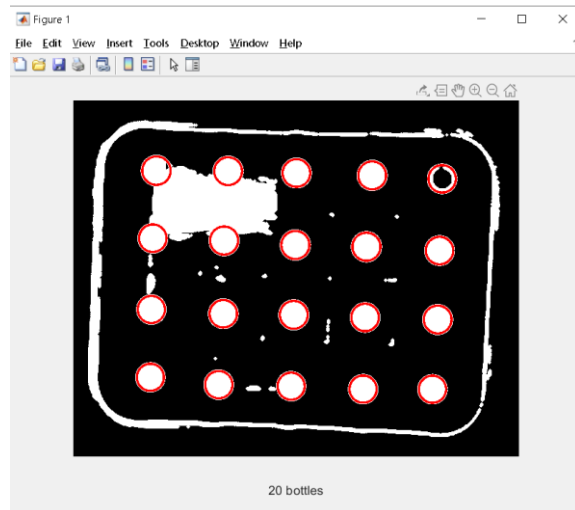
bottle_crate_10.png



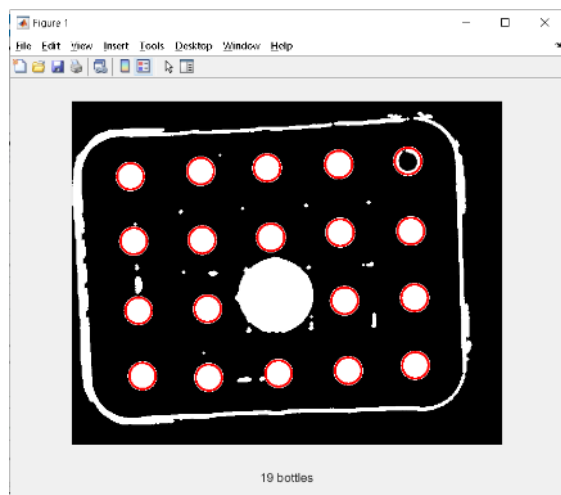
bottle_crate_11.png



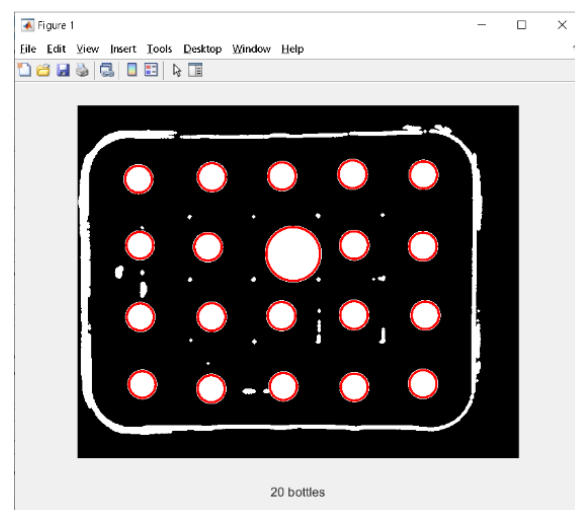
bottle_crate_12.png



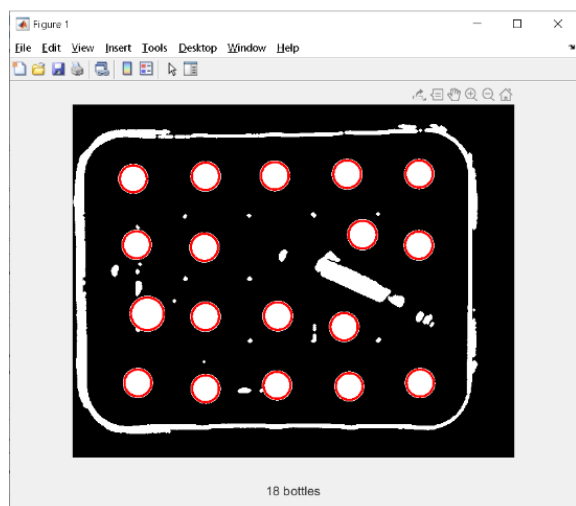
bottle_crate_13.png



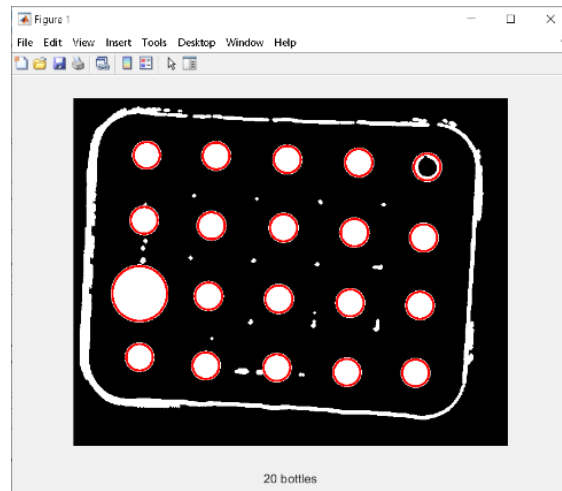
bottle_crate_14.png



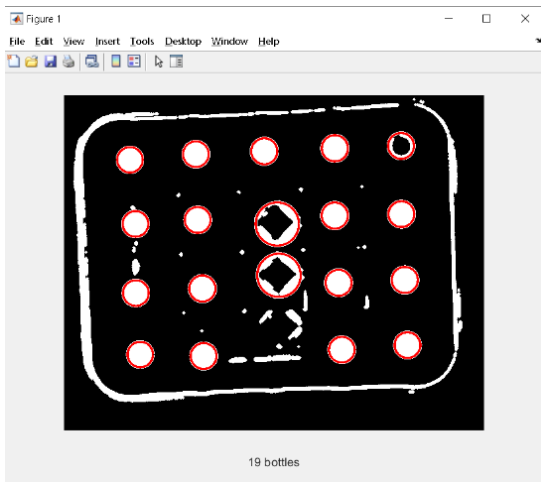
bottle_crate_15.png



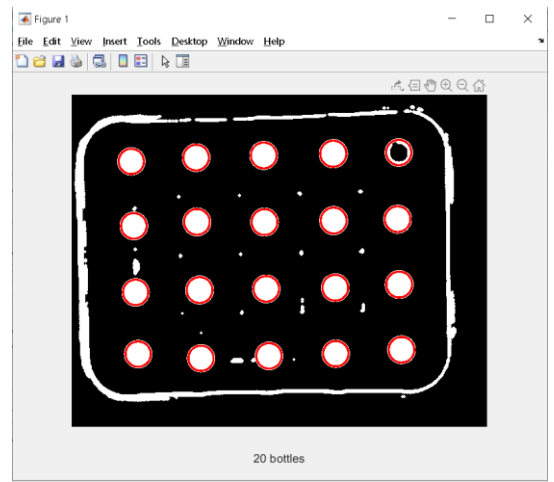
bottle_crate_16.png



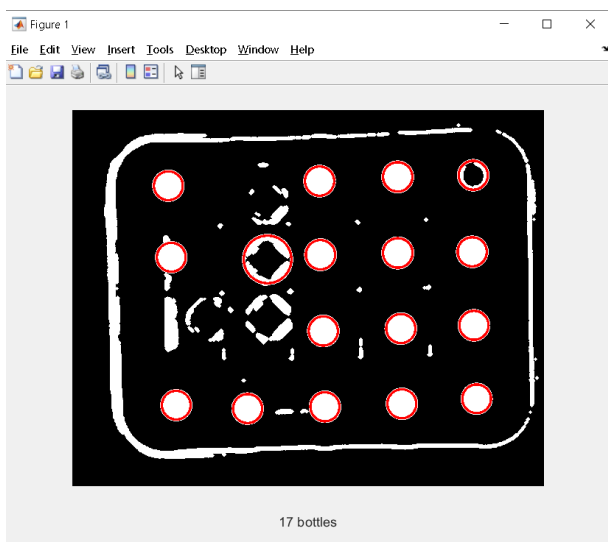
bottle_crate_17.png



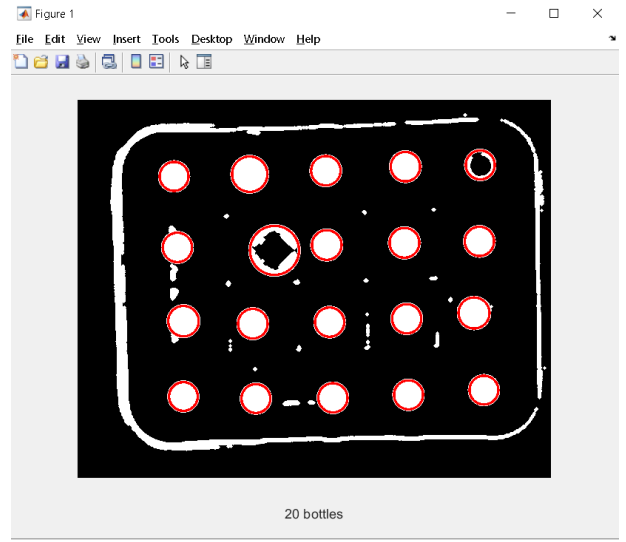
bottle_crate_18.png



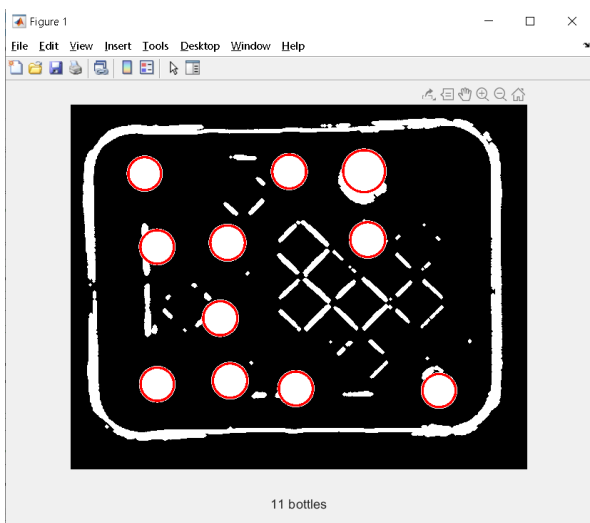
bottle_crate_19.png



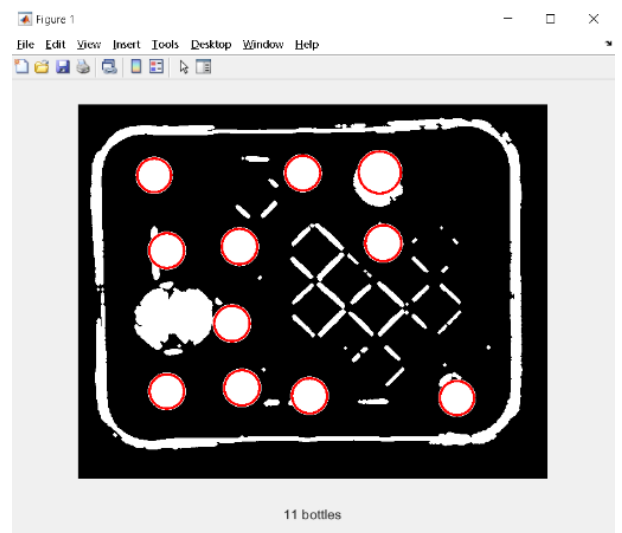
bottle_crate_20.png



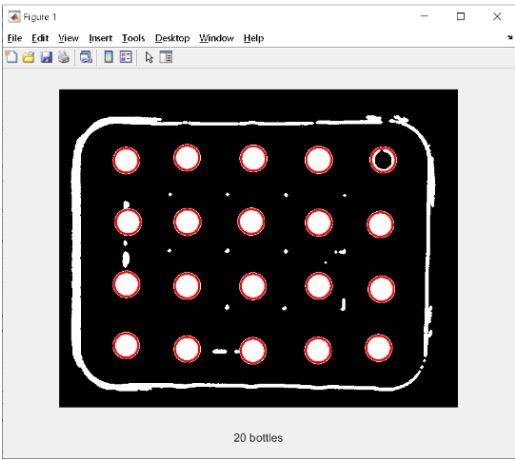
bottle_crate_21.png



bottle_crate_22.png



bottle_crate_23.png



bottle_crate_24.png

