Introduction:

Bottle detection, area finding, and counting are done by a machine vision algorithm. According to the bottle cap and the bottom of the bottle using a circle finding method is marked. The numbers of bottle cap and bottom are detected and shown in the different images. So bottle count as well as missed sequence of the bottle can also be detected.

Prospect and challenges:

Detection process can be done in several processes using a neural network algorithm train a system is an automated approach. But a limitation of training image makes this process challenging. Taking ROI and segment according to the matrix value is another prospect field for image size(dimension). A normal "**regionprops**" use to get area and according to the radius and centre of the circle. But the crate of bottle creates some noise data and hard to detect original bottles.

Procedure:

Matlab have a few image analysis tools, using an app at first get bottle's radius. Then circle finding library function has been used (first with cap circle than with a bottom) and got centre and radius of the bottle. The "**imfindcircle**" function has been used for the bright area with sensation value 0.92. Then a circle has been created using "**viscircles**" function and produced a red circle in bottle cap and blue for the bottom of the bottle. Then according to the length of the radius, bottles have been counted. But images need some pre-processing steps to use. All the images have converted into binary after reading all of them. Then "**imareaopen**" has been used to remove small objects. Then the morphological structure of the image according to disk shape and fill the area with white colour to detect easily.

Result:

The process successfully detects all bottles except those are horizontally laying on the crate. The reason behind not to detect those bottles is the colour of the horizontal bottles are not clear enough to proper regions. Total bottles are detected 439 (434 caps, 5 bottoms) out of 441 and fail to detect 2 bottles. The percentage of accurate detection is 99.55%. Some resultant images are shown below:

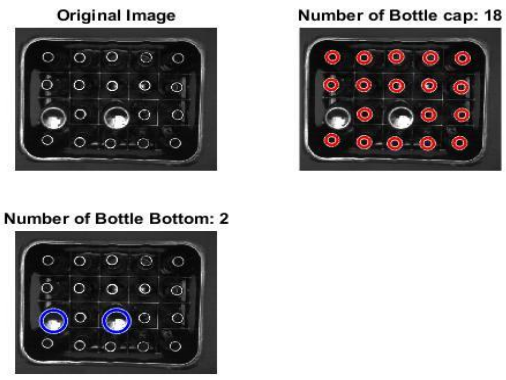

Figure 1: All bottles have been detected for both cap and bottom side.

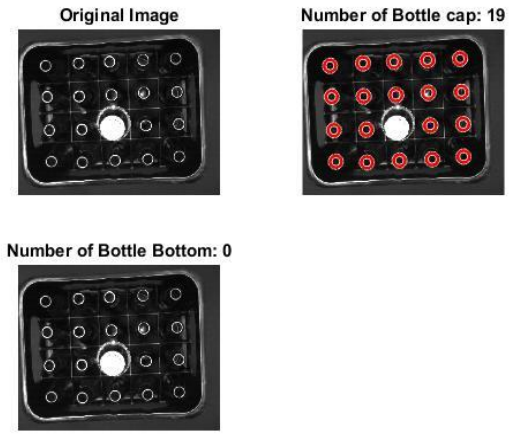

Figure 2: All bottles have been detected ignoring the plastic cup.

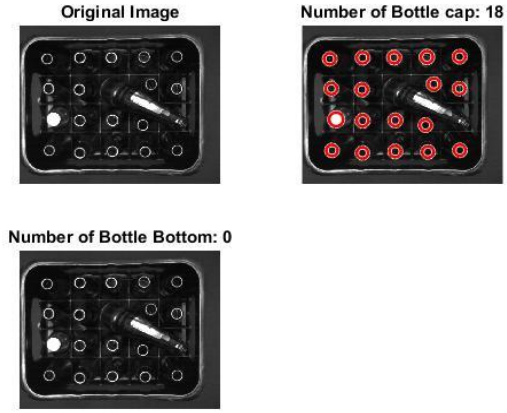

Figure 3: horizontally placed bottle couldn't be detected.