

Home Assignment#1

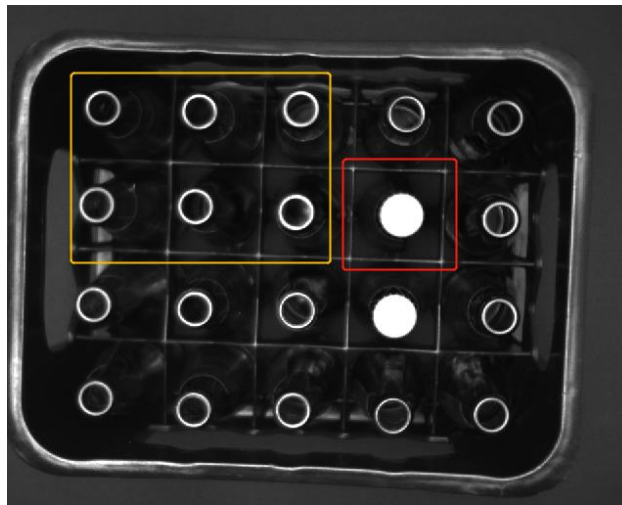
Calculation of number of bottles in a crate

No collaborator

Problem and Solution description:

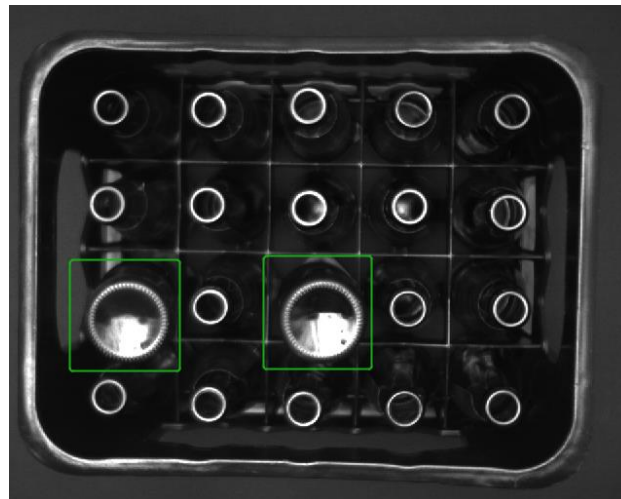
There are mainly three different types of bottles need to detect separately.

First, small circle bottles, including hollow(dark) and solid(bright) ones.



I use the 'imfindcircles' method in MATLAB to detect those bottles, and also need to limit those bottles' diameter in a small range.

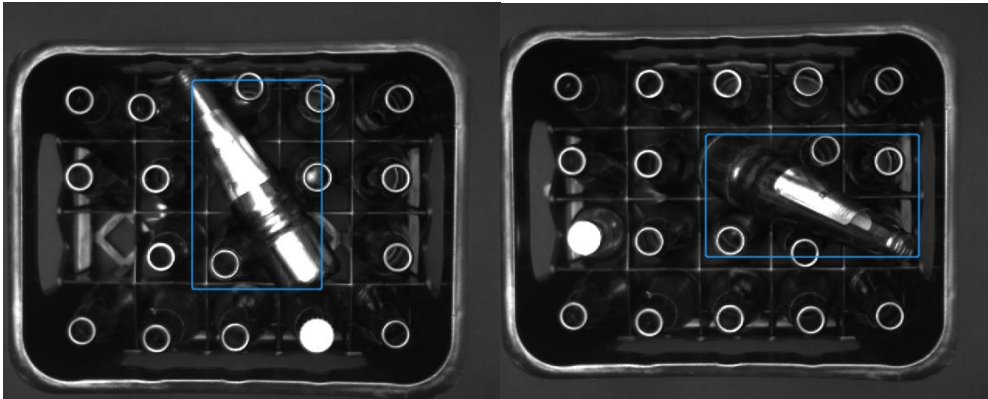
Second, the bottom of bottles, also shown in image as large circle.



I also use the 'imfindcircles' method in MATLAB to detect those 'large' bottles but need to change those bottles' diameter in a large range.

Both of those detection can also be achieved with Sobel or Canny Edge filter.

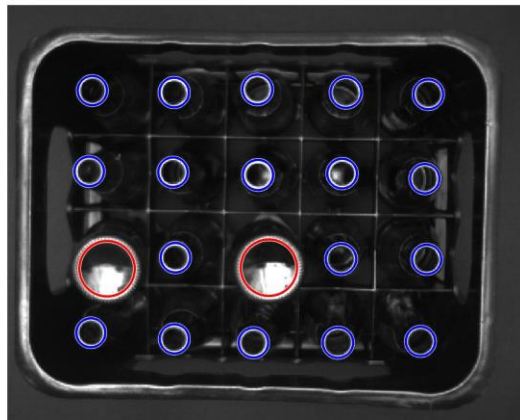
Third, irregular-placed bottles:



I change the image to binary image firstly and then find the brightest area. If the value of area is under the range of irregular-placed bottles area, it can be proved that we detected this type of bottles.

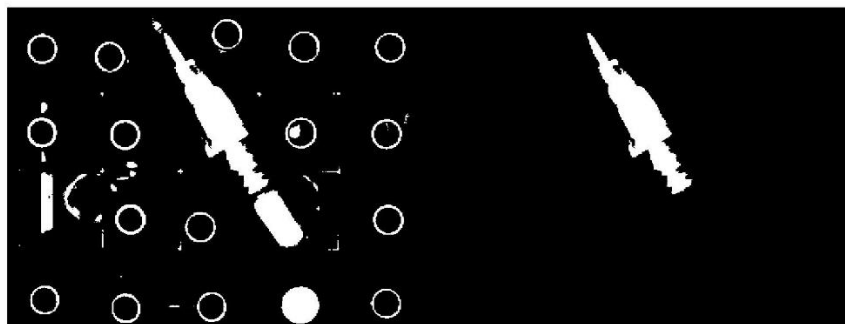
Program description:

The detection of large circle and small circle bottles in MATLAB:

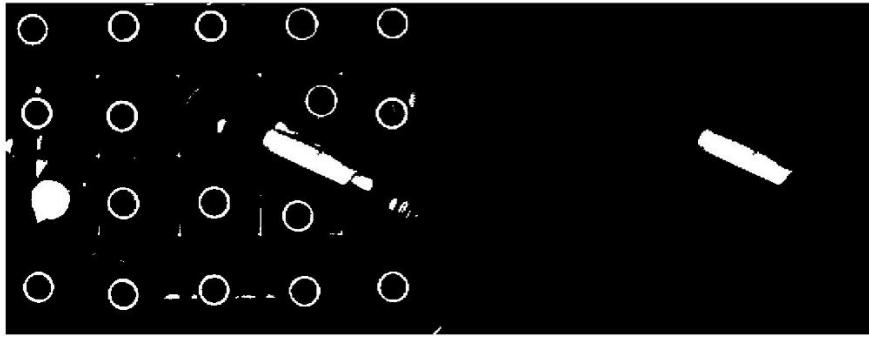


bottle_crate_3.png

The detection of irregular-placed bottles in MATLAB:



bottle_crate_10.png

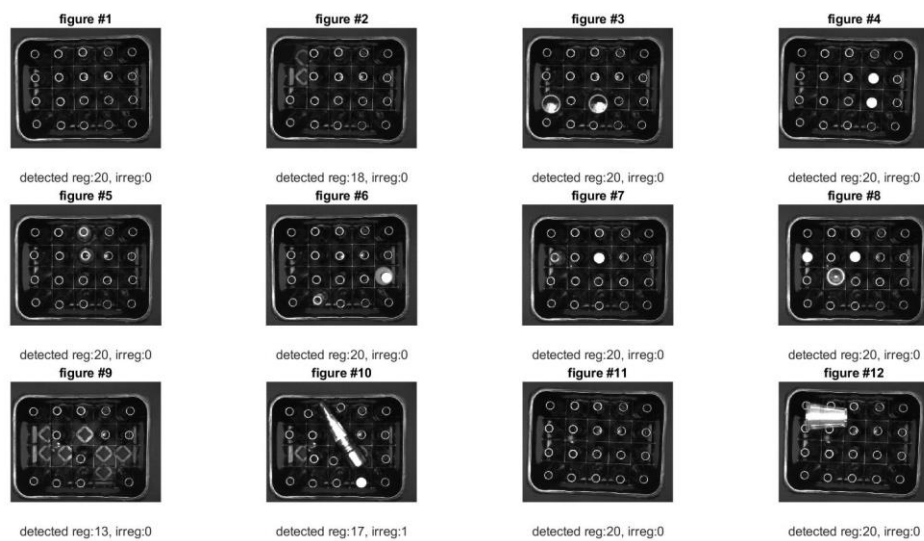


bottle_crate_15.png

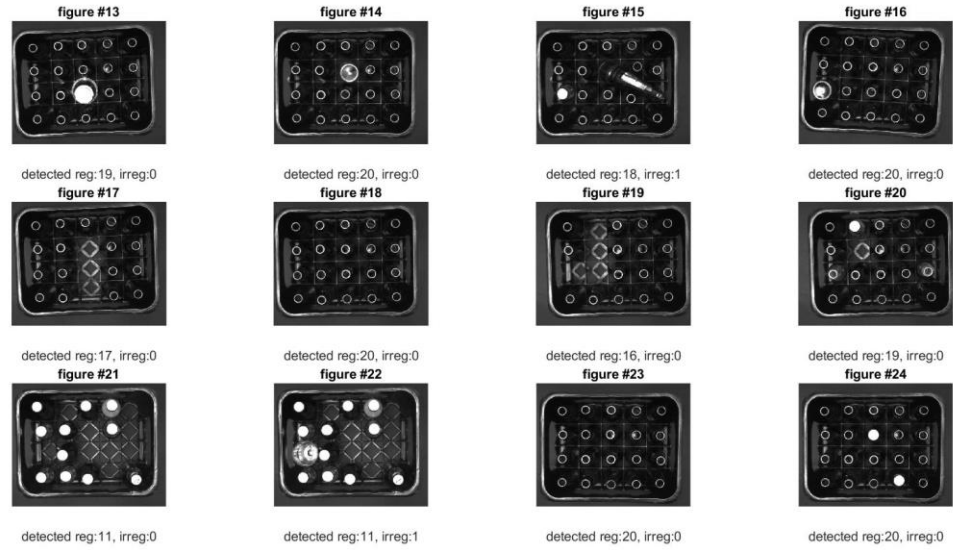
Experimental result:

I detect all 24 images of bottles in crate. Although there is no actual correct label in every image, it looks well in the result of detection. The experimental result are as follows:

(‘reg’ means the number of regular bottles, while ‘irreg’ means irregular-placed bottles)



the result in figure 1-12



the result in figure 13-24

Conclusion:

Bottles' number detection is a classic computer vision question. I think there are many different methods can solve this problem. For example, Sobel, Canny and Laplacian Edge detection. Meanwhile, MATLAB provides more ready-made methods to make the detection more convenient. However, I think the difficulty of this problems is how to detecting irregular-placed bottles. For example, in figure#10 and figure #15. My idea is based on the area of those bottles. If the area matches the size of bottles, or the value is in the range of irregular-placed bottles' area, it can be regard as bottle. The advantage of this method is can detecting all irregular bottles. On the other hand, how to set the range correctly is also an empirical question.