Computer Vision Assignment 1

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High level overview

My solution started by messing with histograms, looking for differences between images with different numbers of spoons. I then noticed that only keeping the saturation channel of the image was an interesting path to pursue.

My solution then does the following steps on the image:

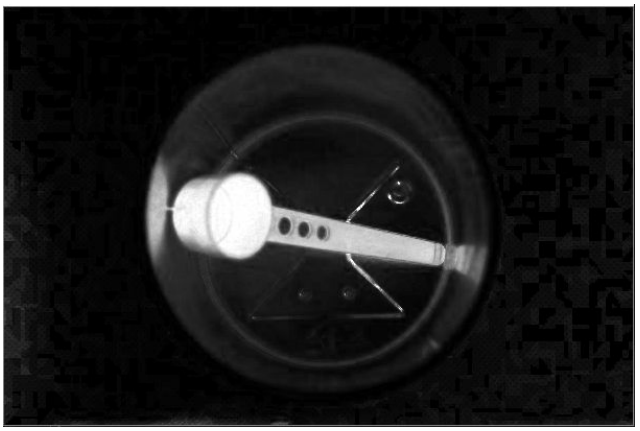
- Extract the **saturation channel** from the image
    - This yields a grayscale image where the spoons are quite bright.
- Apply a **threshold** to the image. Given that the lighting conditions were quite similar and we only wanted to keep a specific part of the image, I used a constant threshold value which seemed to work best (of 175).
- Apply an "**Open**" operation on the resulting image such as to remove bright bits of the bowl which may be leftover from the thresholding.
- Count the number of white pixels and give an expected number of spoons in the image. The values used for predicting are:
    - Less than 2000 pixels: 0 spoons
    - More than 2000, less than 1000: 1 spoon
    - Over 1000 pixels: 2 spoons.

This seemed to give me quite accurate results in terms of determining the number of spoons within the image.

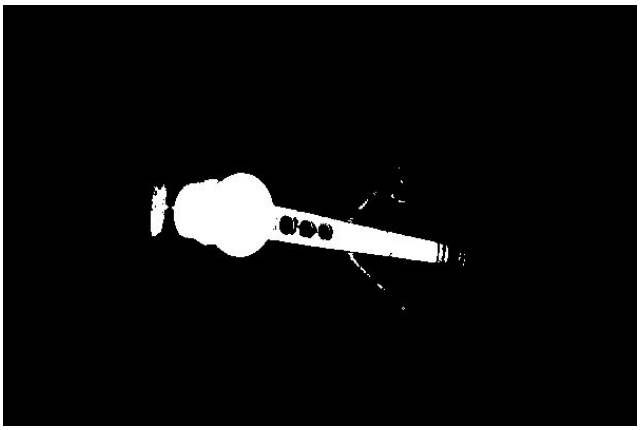
Processing examples

Original image:

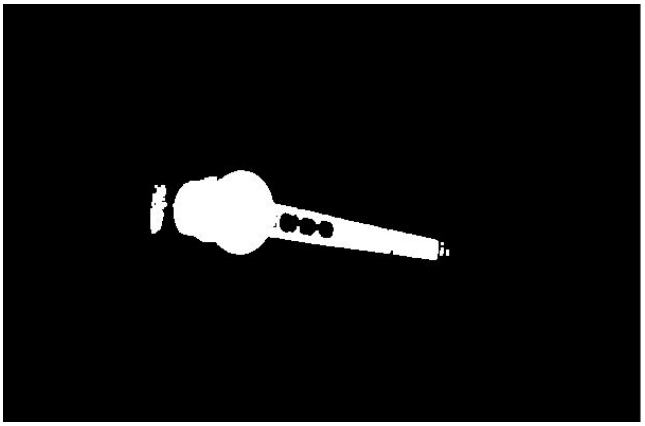
Grayscale image of the saturation:



With a constant threshold applied:



After closing operation:



Example input / output image:

Measures

Using all 21 images provided, I obtain the following values:
True Positive: 19
True negative: 0
False Positive: 1
False Negative: 1

Computing precision metrics:

Recall = TP / (TP + FN) = 19 / 20 = 0.95
Precision = TP / (TP + FP) = 19 / 20 = 0.95
Accuracy = TP + TN / Total Samples = 19 / 21 = 0.905
Specificity = TN / (FP + TN) = 0 / 1 = 0