

HW09

1. Overview

The goal of this assignment is to write a program which takes in two images and attempts to segment the foreground objects from the background using Mahalanobis distance.

2. Approach Used

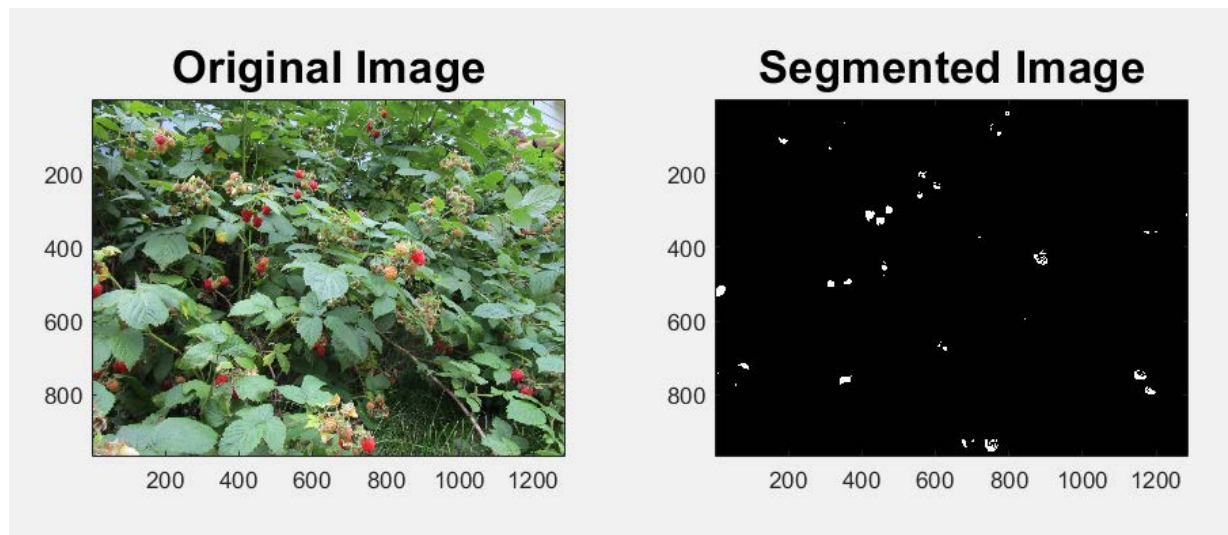
In this assignment, I used the same method of color detection for both parts.

Upon reading the RGB image, I first asked the user to select foreground and background pixels in the image. Then I converted the image to Lab color space and extracted the first two channels, a and b. Using the pixels taken from the user, I extracted the linear indices of the foreground and background pixels from the two channels to use as features for the classification. I then calculated the Mahalanobis distance of each pixel in the image to each of the foreground and background features. Using these distances, I classified the pixel as 1 if the Mahalanobis distance to foreground is less than the distance to background (with a tolerance of 2) and 0 otherwise.

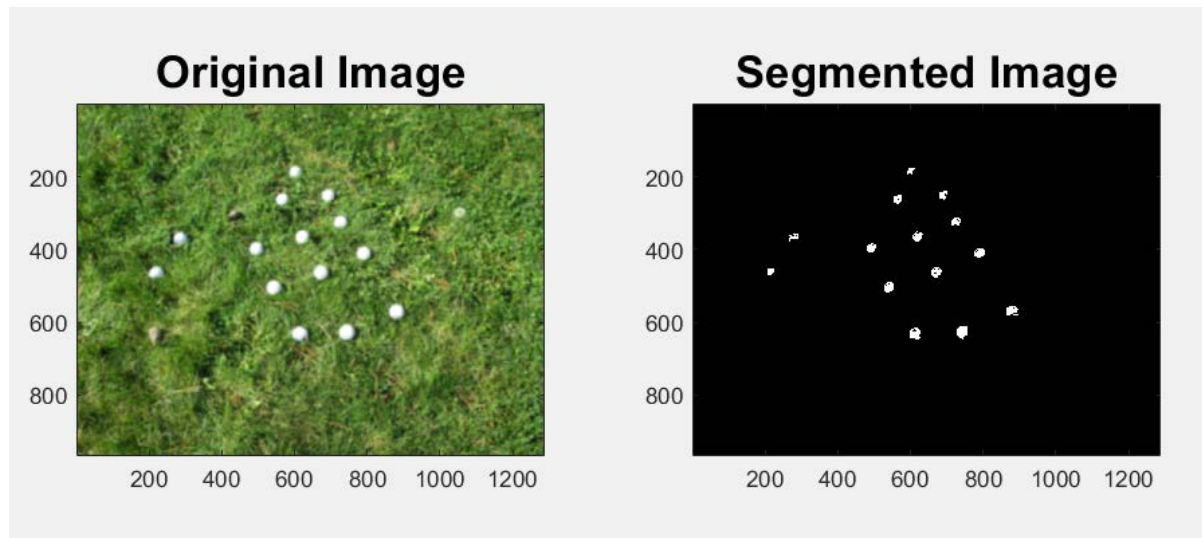
For better classification, I tossed everything outside of one standard deviation, and re-adjusted the mean value and used the mean as the threshold distance to target variable as rules for inclusion.

3. Results

Raspberries:



Golf Balls:



4. Discussion

The most challenging part of this assignment was figuring out what features to use and how to use the features with the `mahal()` function of Matlab to calculate the Mahalanobis distance. Also, checking what tolerance worked best for the segmentation took a bit of trial-and-error.

5. Conclusion

In this assignment, I've learned how different channels of a color space can be used as features in classification. I've also learned the importance of using binary images for segmentation.

I've also learned various Matlab functions such as `bwlabel()`, `mahal()` etc., and how each of these can be used for image segmentation.