

Midterm 2 Report

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Introduction

In order to classify the fruits and provide axes on them, a series of steps were performed.

First, we classified the picture into moments which divides the picture into regions. The image is labeled as $f(x,y)$.

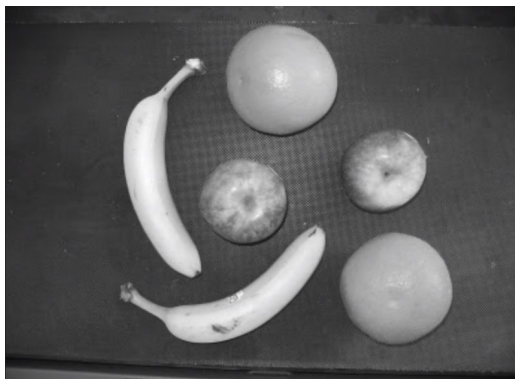


Figure 1

The image is also classified as dark gray or not dark gray which allows Matlab to find the specific labeled regions.

Classification Methodology

The moments are in 2D with the labels $m00$, $m01$, $m10$, $m11$, $m20$, and $m02$. These moments were then used to calculate the central moment of the picture's regions. If there was no centroid of a region, then the calculation would exit the central moment for

loop calculation. Now that the central moments of the regions have been calculated for the picture, the eigen-values can be calculated. The eigen-values are what classify each fruit. Bananas, oranges, and apples all have different axis lengths. The eigenvalues are used to calculate the semimajor and semiminor axis lengths.



Figure 2

These axes lengths help calculate the eccentricity. The eccentricity is used to classify the shape of the fruit. If the eccentricity value is closer to 0 then the shape is closer to a circle. If the eccentricity value is closer to 1 then the shape is closer to a line. To find the eccentricity, the equation uses the

distance from the center of an ellipse. For the banana in the picture, if the eccentricity value calculated in the program was calculated between 0.94 and 0.98, then the axis was paired with the banana. If the eccentricity value was less than 0.6 but more than 0, then it was classified as “round fruit,” which is the apples and the oranges. Then we had to differentiate between the apples and oranges since both of the fruits are round. If the radius of the fruit is larger than the mean, then that fruit was classified as an orange. Below displays the final image with the respected axes to each fruit.

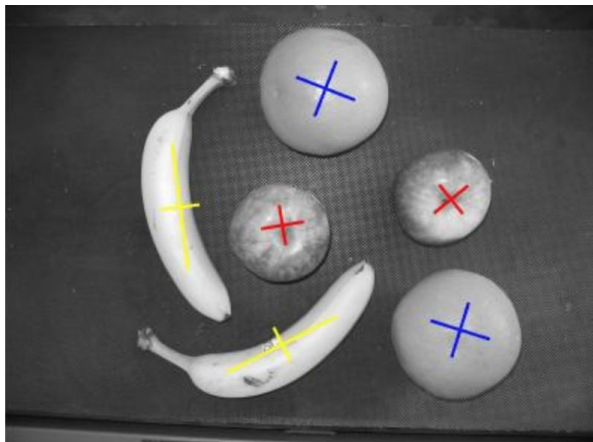


Figure 3