

# Orange Detection Algorithm

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**Abstract**—This document is a model and instructions for L<sup>A</sup>T<sub>E</sub>X. This and the IEEEtran.cls file define the components of your paper [title, text, heads, etc.]. \*CRITICAL: Do Not Use Symbols, Special Characters, Footnotes, or Math in Paper Title or Abstract.

**Index Terms**—Image Processing, Fruit, Applied image colour segmentation, Automated counting

## I. INTRODUCTION

Counting and identifying the number of ripe fruits is important to automate harvesting fruits when they are ripe and to identify how many ripe fruits there are on a tree.

## II. EASE OF USE

### A. How we Selected the threshhold vales

### III. ALGORITHMS

based off of this [1]

#### A. Values

#### B. Stages

1) Step 1: Run NDI

2) Step 2: In the RGB colour space run a mean filter.

3) Step 3: convert the image to the YCrCb colour space.

run a threshold on the Cr values. how the threshold is discusses in sec. III-A.

4) Step 4: run a threshold on the Cb values. how the threshold is discusses in sec. III-A.

5) Step 5: Then do a bit-wise and to create a mask

$$pixel_{final} = pixel_{NDI} \wedge pixel_{mean} \wedge pixel_{Cr} \wedge pixel_{Cb} \quad (1)$$

6) Step 6: Do a circle count on the mask image

## IV. RESULTS

## V. DISCUSSION

### A. Limitations

When we were testing our algorithm we noticed that it worked significantly better on images larger than 1300x1300px. It also does not work on images where the diameter of the oranges is greater than half of the screen size, or if the oranges are very small (less then 150px). We determined that this short coming can be easily overcome by using image resolutions above that size. In the application where this algorithm would be used the image quality would be known and the zoom of the image would be consistent allowing the mentioned shortcomings to be overcame.

## REFERENCES

- [1] A. Payne, K. Walsh, P. Subedi, and D. Jarvis, “Estimation of mango crop yield using image analysis – Segmentation method,” *Computers and Electronics in Agriculture*, vol. 91, pp. 57–64, Feb. 2013.

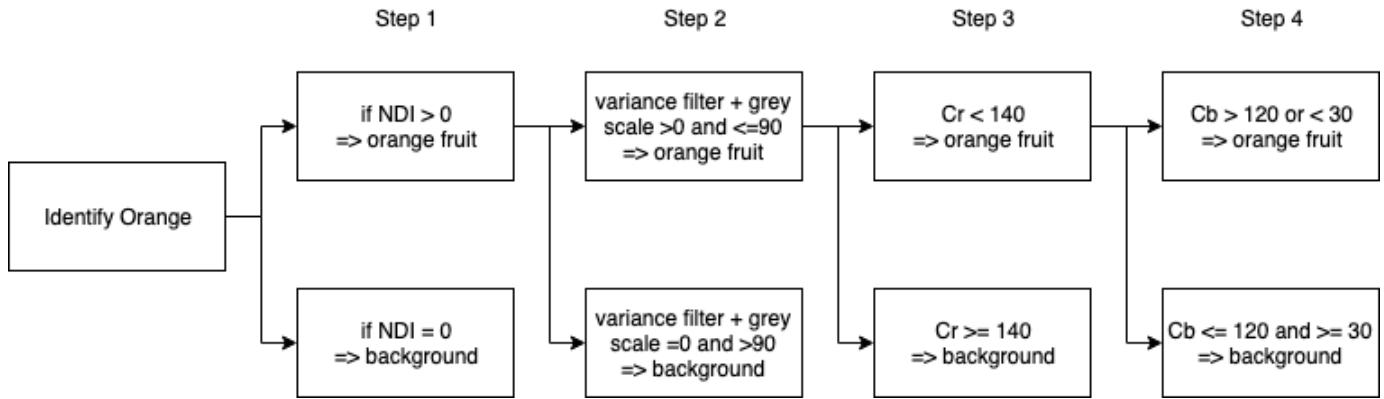


Fig. 1: Outline of the process of the stages of the algorithm



(a) Origonal

(b) Result of step 1

(c) Result of step 2



(d) Result of step 3

(e) Result of step 4

(f) Result of step 5



(g) Result of step 6a

(h) Result of step 6b

Fig. 2: An example image going through each step to detect the oranges within the image