

A Synopsis on

# **An Automated Fruits Quality Detection Framework Using Colour Spectography**

Submitted in partial fulfillment of the requirements  
of the degree of

**Bachelor of Engineering**

in

**Information Technology**

by

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## CERTIFICATE

This is to certify that the project Synopsis entitled “**An Automated Fruits Quality Detection Framework Using Colour Spectography**” Submitted by “**Surajkumar Yadav (15104022 ),Barun Roy(16204023),Khan Mohd Shoeb(16204029),AjayKranti Vishwakarma(14104022)**” for the partial fulfillment of the requirement for award of a degree **Bachelor of Engineering in Information Technology**.to the University of Mumbai,is a bonafide work carried out during academic year 2018-2019

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## Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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# Abstract

An automated fruit quality detection system for sorting and grading of fruits and defected fruits detection discussed here. The hardware prototype is being created by using low power arduino. The main aim of this system is to replace the manual detection system. This helps in speed up the process improve accuracy and efficiency and reduce time. The system design considers some features that includes fruit colors and size, which increases accuracy for detection of fruits pixels. Then image scanning is done to get required features of fruits such as texture, color and size. Defected fruit is detected based on color detection is done based on thresholding and size detection is based on binary image of fruits. Sorting is done based on color. Color Spectrography offers solution for the automated fruit size grading to provide accurate, reliable, consistent and quantitative information apart from handling large volumes, which may not be achieved by employing the human graders.

# Introduction

Fruits supply several vital components to the human organism and are important constituents of a healthy and well balanced diet. Fruits and vegetables are the major sources of vitamins A and C in the human diet and constitute a rich source of photochemicals and other bioactive components with potential anti-carcinogenic and cardiovascular risk reduction properties. In addition, fruits and vegetables are good sources of fiber, water and minerals and they bring to our daily food consumption diversity in color, texture and flavor. However, appearance, texture, flavor and levels of these important bioactive compounds in fruits and vegetables are greatly influenced by postharvest conditions such as precooling method, storage temperature, humidity and atmosphere composition, type of packaging and distribution method and if fruits and vegetables are handled under improper conditions, a great part of these health benefits may be significantly lost.

Diseases in fruit are the reason of destroying and economic losses and agriculture field. Absolution of this problem for the detection and classification of fruit diseases is considered and experimentally validated. Typically, all the available solution use image processing. This is not feasible in industry where fruits cannot be photographed and then a dedicated computer may not be available for such processing. Also, the image processing-based approach consists of the following complex steps, in the first step RGB to Gray conversion, median filtering, edge detection, and morphological operations are used for the image segmentation. In the second step shape approximation technique are used for feature extraction, histogram of chain code and density of pixel widely used for feature extraction from the segmented image, both feature extraction technique are compared and in the third steps images are classified classes by using a different kernel in Multi-class Support Vector Machine. This is a complex process and may not be feasible in real world industries. Hence, we propose alternative system, which uses hybrid model of low-cost hardware and simple software model. In recent years, automatic visual inspection technology has become more potential and important to fruit grading applications. This is due to that the quality of fruits are the important factor for the consumer and so essential for marketing a uniform high-quality product. The automated fruits grading technique have been set up to reduce the production costs and Improve fruit quality and replace the manual technique for grading of fruits as manual inspection is facing problems in maintaining consistency and uniformity. Two kinds of fruits have been inspected in this project; namely are apple and mango. A prototype of an automated fruit grading system is designed and developed in this paper to detect the defects on of the surface of fruits line.

Spectrometers can accurately distinguish and quantify radiation in the ultraviolet, visible, and infrared regions of the spectrum. You know that visible light is composed of a range of frequencies. The frequency of the radiation is proportional to its energy and the wavelength of the radiation is inversely proportional to the energy. Red is the lowest energy visible light and violet is the highest. A solid object has color depending on the light it reflects. If it absorbs light in the red and yellow region of the spectrum, it will have a blue color. Here is an example. Chlorophyll, the pigment that makes plants green, absorbs light in the red end of the spectrum and light in the blue end of the spectrum.

# Objectives

The aim of this study is to develop machine vision techniques based on image processing techniques for estimation the quality of orange and tomato fruits and to evaluate the efficiency of these techniques regarding the following quality attributes: size, color, texture and detection of the external blemishes.

The specific features are to quantify the following attributes for quality detection of fruits:

1. Color,
2. Texture ,
3. Size (projected area),
4. External blemishes (detect defected parts),
5. Develop image processing techniques to sorting fruits into quality classes based on size, color and texture analysis,
6. Evaluate the accuracy of the techniques by comparison with manual detection.

# Literature Review

No.	Title of paper	Author Name	Publication	Methodology	Limitation
1	Hybrid Approach Of Fruit Detection	Bhavani J .S	IEEE(2016)	Random Forest classifier	Not Accurate
2	Color Based Fruit Analysis Using Raspberry Pi	Ms.P.R Chavan	IEEE(2018)	Raspberry Pi & Color Image Processing	Costly & More Complex Hardware
3	Fruit Quality Inspection System	Manali R.S	IEEE(2017)	RGB Image	Non Effective For Large Scale

In [1] authors,They have created a system to check quality of apple fruit.They have use the function called Random forest classifier which was good but its has some drawback.This system was introduce to detect quality of apple fruit only and also result given by system was not accurate.They mainly focus on image of object to determine its quality.

In [2] authors,They have built the system for fruits detection using Raspberry Pi .which make easy to build this system but at same time its costly and difficult to implement it.for writing code in raspberry pi they have use matlab . Which make easy for coding and to implement logic.

In [3] authors,They have build system which have system features likes detecting fruits by using image processing ,size ,texture and color . They have place infrared sensor on conveyor belt to place fruits in proper place . So camera can take picture of fruit and then based on its color , texture and size. Its was not very effective for large scale industries because its more time for checking quality of fruits ,Which make this system very expensive.

## Problem Defination

The Quality Detection of Fruits is totally a manual and cumbersome process.

The problem that arises is that there is no single fruit which can be said it is pure from outside just by looks. This causes the humans to buy from various unreliable sources and understanding of the fruit is unclear at the end. This leads to health problem in human.

Also, for sellers and common peoples proper platform is not available currently to check the fruits.

Manual method of fruits quality detection is also a costly process.

Hence,there is a need to upgrade the manual system with automated system which can detects the quality of fruits using colour spectrography.



# Proposed Architecture

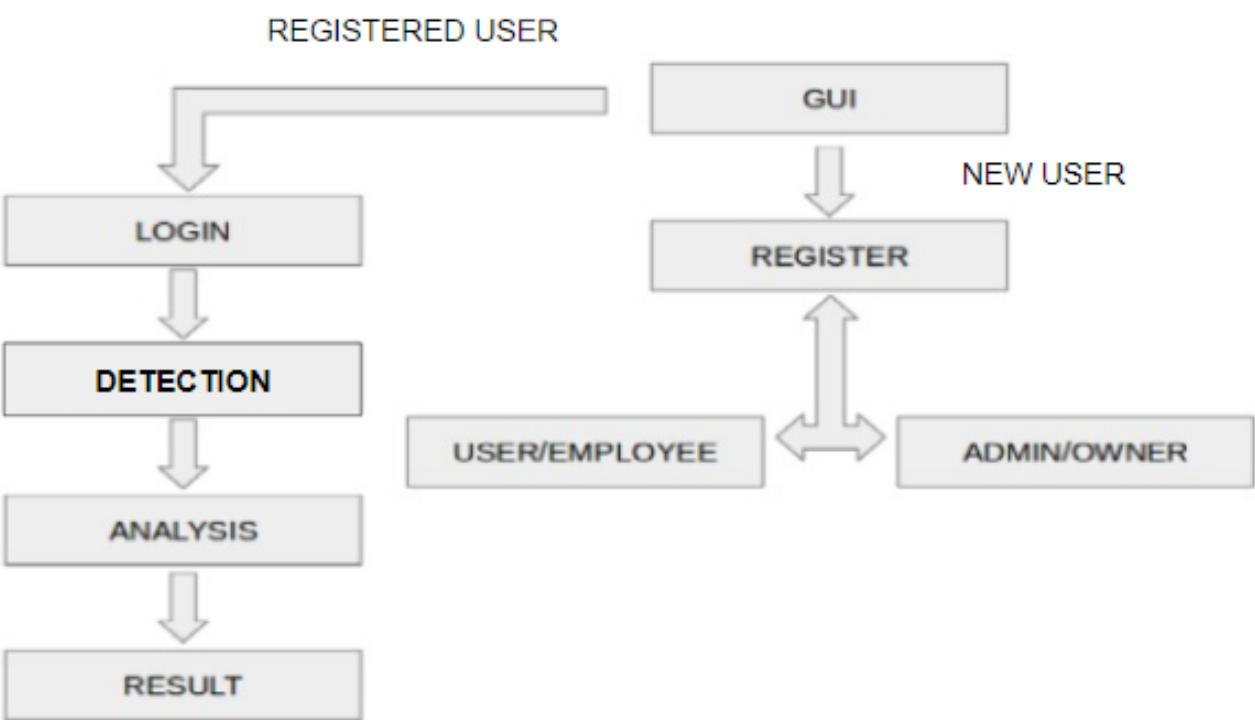
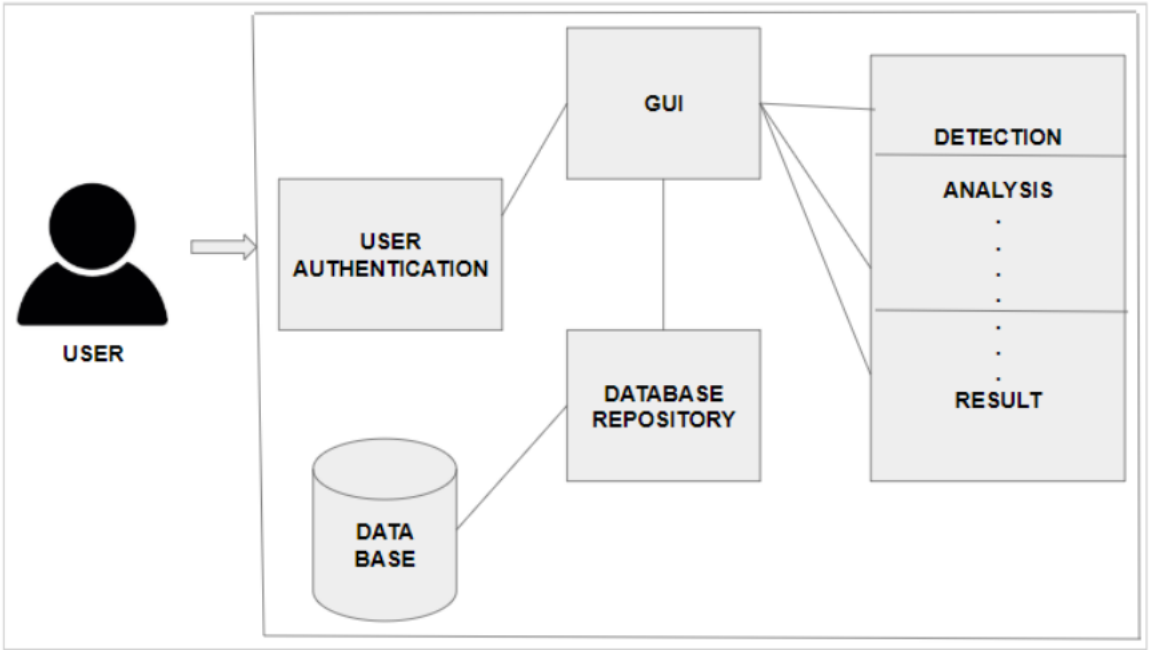


Figure 1: Proposed Architecture

# Use Case



## Summary

The initiated system is a demo version. In future, for the great volume of production the number of cameras ,sensor and length of conveyor system can be changed according to our needs. This project presents new integrated techniques for sorting and grading of different fruits. Generally image capture is a big challenge as there is a chance of high uncertainty due to the external lighting conditions, so the advantage of gray scale image is taken into account, which are less affected to the external environment changes as well as beneficial for finding the size of a fruit.

## References

- [1] Hybrid approach for apple fruit diseases detection and classification using random forest classifier.Bhavini J. Samajpati ; Sheshang D. Degadwala 2016 International Conference on Communication and Signal Processing (ICCSP)
- [2] Color Based Fruit Analysis Using Raspberry Pi using image Processing.Ms.P.R Chavan 2018 International Conference on Communication and Signal Processing (ICCSP)
- [3] Fruit Quality Inspection System using RGB image.Manali R.S 2017 International Conference on Communication and Signal Processing (ICCSP)