

Detection System to Analyze and Generate Consumable Rate of Fruits

Anita Mahajan¹, Somik Sutradhar², Pranali Thorat³, Ganesh Sanap⁴, Meghna Singh⁵
Professor, Computer Department¹, Dr D Y Patil school of Engineering and Technology, Pune , SPPU¹
Student, Computer Department², Dr D Y Patil school of Engineering and Technology, Pune , SPPU²
Student, Computer Department³, Dr D Y Patil school of Engineering and Technology, Pune , SPPU³
Student, Computer Department⁴, Dr D Y Patil school of Engineering and Technology, Pune , SPPU³
Student, Computer Department⁵, Dr D Y Patil school of Engineering and Technology, Pune , SPPU⁵
Email: anita.mahaja@dypic.in¹, somik1994@gmail.com², pranali21995@gmail.com³, ganeshsanap122@gmail.com⁴, meghna07singh@gmail.com⁵

Abstract-World is moving towards saving energy. It becomes a responsibility for each individual to contribute. The paper aims in saving economy and use of fruits in an appropriate manner. Though it is difficult to detect and determine fruit disease along with its consumption rate looking directly. Using the proposed disease detection system, the stakeholders and the warehouse keeper can determine the usefulness and approximate consumable time duration of the fruit, which will help them get preventive measures and suggestions from the system. Fruits are to be taken as a sample. Image processing has been used to make the system learn, classify and calculate the percentage of diseased fruits. This paper, proposes an idea for data mining for implementation of query images. Also, binarization concept is used for conversion of grey scale images into black and white images which provides accuracy in detection.

Index Terms- Edge Detection, Image Preprocessing, Binarization, Image Acquisition, Digitalization.

1. INTRODUCTION

Fruits being vulnerable to infection during the course of their cultivation and the factors favoring such infection are relatively unknown. This causes a major portion of the produce to be susceptible to infection, and in turn cause economic losses. In the existing system, input images are classified and mapped to their respective disease categories on the basis of three feature namely, color, texture and morphology. In existing system disease detection system only assume that fruit is in good or bad condition. There is no such device which can precisely tell about the disease occurred and the percentage of disease in the fruit. The problem stays with less affected fruits being thrown always which causes losses. The affected fruit can be consumed well with ample knowledge of percentage of disease. The system identifies the fruit disease in percentages format and shows the graphical representation of disease. The aim of the system helps stakeholders in identifying the original image diseased fruit and gives them vivid opportunity in food saving strategies. Modules used in the system identifies damaged or rotten part of fruits by using image acquisition, image processing, image segmentation, feature extraction.

2. LITERATURE SURVEY

[1] The paper gives farmer greater accuracy in knowing about the environmental conditions and factors affecting the fruit at the time of cultivation. [2] The review paper aims to give a broad knowledge about the image categories and problems in classifying the fruit diseases. [3] Provides overview of data mining techniques for prediction of possible fruit infection. Classification technique to classify unknown samples using set of classified sample is done. [4] The paper talks about Wireless sensor used for detection of food quality. It also proposes system which detect meat contamination through a dual tag sensor by using UHF-RFID. [5] In this paper images are mapped with respect to categories of disease. Grading of the fruits is done considering weight as factor. [6] Conclude different segmentations feature extraction and classification techniques for plant disease detection using its leaf or fruit. No such segmentation techniques applicable in all images so use any of the technique which is suitable for application. [7] The paper concludes to find the area or the portion of the chili plant which has been infected. It also gives a precise location for the chemicals to be applied in turn reducing the chemical content to the plant and economic loss. Leaf images captured are processed to determine the healthiness of each plant. [8] This paper explains real time weed detection

system as if weeds are grown with crops, it competes with them for light, water, space and nutrients resulting in reduction of yield. They have used K-means and Bayes classifier to measure Euclidian distance. In this [9] manual sorting method is used to sort fruit which take more time to process. To avoid process of sorting and grading machine vision system is used. [10] This paper uses citrus leaf disease and its symptoms. it mainly focuses on citrus trees like grapes, lemon limes and orange leaves which are affected by various diseases like citrus canker, anthracnose, over watering, citrus greening disease. The symptoms of attack are distinguished through leaves, stems or fruit inspection. In [11] solution for detection of apple fruit disease is provided. Classification is done using multi class SVM. Different feature extraction techniques such as GCH, CCV, LPV, CLPB is compared to achieve accurate. [12] The paper uses apple fruit and checks via Bayesian classification. The stem & calyx of the fruit is generally detected as the infected. this kind of error could be solved by taking multiple angled view of fruits.

3. Proposed System

For the implementation of proposed system, we are going to use several methodologies, techniques and algorithm. Proposed model contains following steps:

- (1) Image acquisition
- (2) Image pre-processing
- (3) Image segmentation
- (4) Feature extraction

In the proposed System, we take image as input with help of an external camera or android phone camera. The image further proceeds towards the processing phase. After completion of processing delivery of result in terms of percentage and graphical format is shown. Fig. shows system architecture of proposed system.

3.1. Image acquisition

Image acquisition can be said to be the action of taking an image, so that it can be processed in the system. Performing acquisition is always the first step in the workflow. Here images of different varieties of rotten and infected fruits is considered as an input.

3.2. Image pre-processing

Images from acquisition stage should be able to identify the presence of unwanted background, poor resolution of camera etc. It aims to eliminate

unwanted distortion and enhance some image features. Data pre-processing includes cleaning, normalization, transformation, selection etc.

3.3. Image segmentation

It is the process of segmenting rotten and infected fruits for classification. We use clustering technique for image segmentation followed by image extraction.

3.4. Feature extraction

Feature extraction is a process to select important characteristics of an image. We have considered color as one of the features in this work. In many cases, the texture becomes ideal for recognition. On the basis of color and textural features of the image samples will be recognized and classified into defected and non-defected. Color space are important for the estimation of percentage of disease. Percentage of disease is to know the prevalence and extent of damage in fruits. The percentage of affected area is calculated using equation:

$$\text{Percentage} = (\text{Affected area}/\text{Total area}) * 100$$

Where, affected area= Number of brown count.
Total area = Total size of fruit.

Feature Extraction is used to validate the accuracy and efficiency of image using features like color, texture, shape and etc. Techniques used to extract such features from image are Global Color Histogram and Local Binary Pattern.

3.1.1. Global Color Histogram

Global Color Histogram (GCH) is used for encoding the information present in image. It is the simplest approach for that. A GCH is a set of ordered values, for each distinct color, representing the probability of a pixel being of that color.

4. K-means Algorithm

- (1) Centers to be placed(k).
- (2) Take each data items(pixels) and associate it with the nearest to the center.
- (3) We need to recalculate the (k) new centroids.
- (4) New bindings will be formed between old data items and new centroids.
- (5) Loop will be generated until centers get fixed.

5. Figures

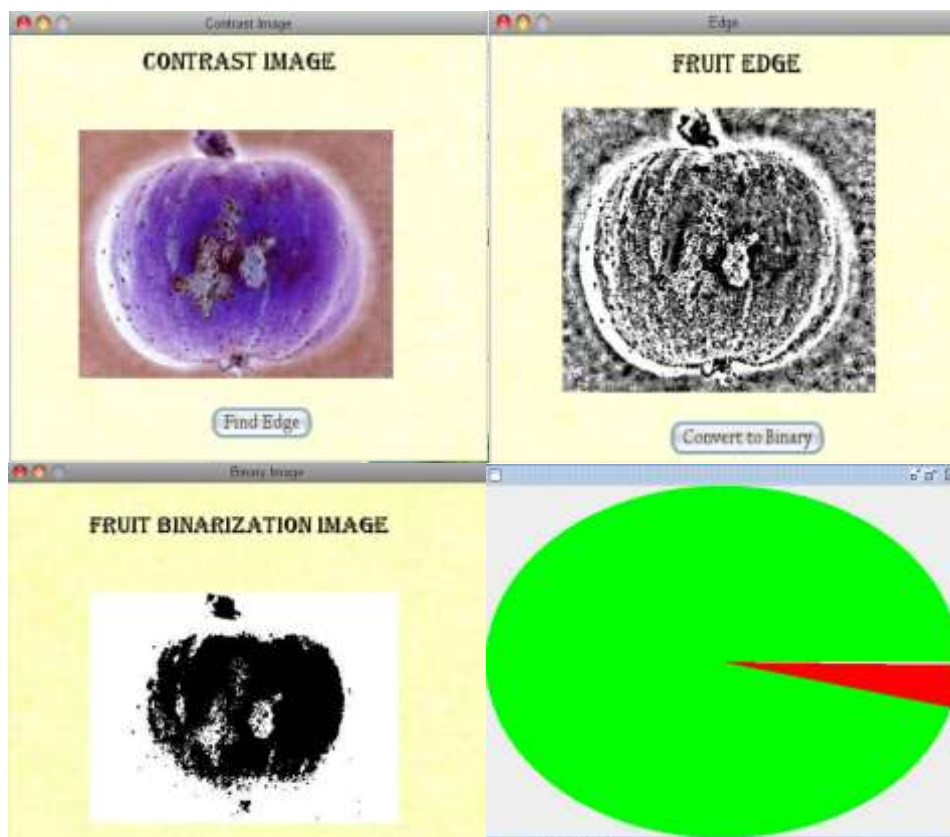


Fig. 1. Modules of processed image

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