

# IMAGE PROCESSING BASED MONITORING OF PESTICIDES AND QUALITY ANALYSIS OF FRUITS

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## ABSTRACT

Nondestructive quality assessment of natural products is significant and extremely essential for the food and agrarian industry. This task presents organic product quality and pesticides identification framework. The framework configuration considers a few elements that incorporates organic product tones and size, which increments precision for discovery of natural products pixels. Histogram of Oriented Gradients (HOG) is utilized for foundation expulsion, for shading grouping Support Vector Machine (SVM) gave. The fundamental thought behind the histogram of arranged slope is that the nearby appearance and state of item in a picture can be depicted by the force dispersion of inclinations or bearing of the shapes. As of now, organic product quality distinguishing and reviewing framework have the disservice of low effectiveness, low speed of evaluating, significant expense and intricacy and abundance of pesticides. Picture PROCESSING offers answer for the robotized natural product size reviewing to give precise, solid, predictable and quantitative data. Here we will likewise get the proportion of pesticides to be utilized to decrease the gamble brought about by unreasonable use of pesticides on human wellbeing. So that once it sends out, the end shopper will get it new. The equipment model additionally made by utilizing open CV ultra low power microcontroller.

Catchphrases: open CV, python picture handling, transport arrangement, IR sensor.

## I. INTRODUCTION

To further develop the organic products' quality and creation proficiency, to diminish work intensity & over the top pesticides, it is important to explore nondestructive programmed recognition innovation. Natural product nondestructive location is the most common way of distinguishing organic products inside and outside quality with next to no damaging, utilizing an identifying innovation to make assessment agreeing a few standard principles. These days, the nature of organic product shape, default, shading and size and so forth can't assess by conventional techniques. With the improvement of picture handling innovation, it turns out to be more appealing to recognize natural products quality by

utilizing vision distinguishing innovation. As of now, existing organic products have impediment of low proficiency, low speed of reviewing, significant expense and intricacy. So it is important to foster fast and minimal expense organic product size, pesticides identifying & grading framework. Utilizing non-horrendous detecting methods in natural products industry guarantee the quality and healthiness of natural product. This would increment customer fulfillment and acknowledgment, and upgrading industry intensity and benefit. In the present mechanical period it is important to have a decent organic product quality for great soundness of person, and it is conceivable by reviewing the organic products as per size, test, or we can say nature of natural product. However, for such reviewing enormous labor supply is required. To beat this it is important to have a programmed natural product evaluating framework for quality organic product creation. It is essential to have non-damaging programmed quality identification innovation to working on natural products' quality discovery, the framework ought to have reviewing proficiency and diminish work prerequisite. Organic product non-horrendous recognition is the most common way of distinguishing organic products' by each side without harming the natural product by utilizing an identifying innovation to make assessment concurring a few standard guidelines.

Watchwords: open CV, python picture handling, transport arrangement, IR sensor.

## II. LITERATURE REVIEW:

Hongshe Dang, Jinguo Song, Qin Guo [1] have proposed natural product size distinguishing and evaluating framework in light of picture handling. The framework accepts ARM9 as principle processor and fosters the natural products size recognizing program utilizing picture handling calculations on the QT/Embedded stage. Creators in [2] have proposed framework which observes size of various products of the soil various natural products can be arranged utilizing fluffy rationale, here creator proposed MATLAB for the elements extraction and for making GUI. John B. Njoroge. Kazunori Ninomiya. Naoshi Kondo and Hideki Toita [3] have fostered a computerized evaluating framework utilizing picture handling where the emphasis is on the natural product's

inward and outside abandons. The framework comprises of six CCD cameras. Two cameras are mounted on the best, two on the right and one more two cameras mounted on the left of the natural product. X-beam imaging is utilized for investigating the organic imperfections. Picture handling is utilized to break down the organic product's highlights; size, shading, shape and the grade is resolved in light of the elements. The created framework is worked from a mix of cutting edge plans, master manufactures and programmed mechanical control. J. V. Frances, J. Calpe, E. Soria, M. Martinez, A. Rosado, A.J. Serrano, J. Calleja, M. Diaz [4] introduced a method to work on the presentation, regardless of whether speeding up or precision, of the heap cell-based weighting subsystem in an organic product arranging and reviewing machine to accomplish an exactness of + 1 gram. Wong Bing Yit, Nur Badariah Ahmad Mustafa, Zaipatimah Ali, Syed Khaleel Ahmed, Zainul Abidin Md Sharrif [5] proposed new MMS-based framework plan and created with signal handling for natural product evaluating for customers. The model organization engineering, joining of remote informing framework with signal handling between versatile customers for improvement objects was considered, proposed and planned..

C.S. Nandi, B. Tubu, and C. Koley, "A machine vision-based development forecast framework for arranging of collected mangoes, "IEEE Trans. In play. Meas., vol.63, no.7, pp.1722-1730, 2014. This paper interaction machine vision based framework, reasonable for gathering for mango as per the expiry day accessible subsequent to collecting. The normal exhibition of the proposed mach ine vision based framework viewed as better compared to the human specialists [1]. Miss. Shital A.Lakare1, Prof:KapaleN.D2, "Programmed Fruit Quality Detection System". This paper presents there penny improvement in programmed vision based innovation. Utilization of this innovation is expanding in horticulture and natural product industry. A programmed organic product quality recognition framework for arranging and evaluating of leafy foods organic product discovery examined here[2]

### III. OBJECTIVES:

- To help to detect excessive usage of pesticides in fruits.
- To consume waste of time in slow grading by developing fast and minimal expense natural product estimated identifying and reviewing framework.
- To Increase buyer fulfillment and acknowledgment, and improving industry intensity and benefit
- To achieve efficient utilization of the pesticides.

### IV. BLOCK DIAGRAM:

This robotized framework is intended to beat the issues of manual procedures. Here the equipment model is planned which contains transport framework, reviewing gathering which contains three plates to which DC engine is associated, computerized camera, IR sensor, Arduino uno processor, field screen show on field and evaluating get together, The square outline of a framework is displayed in Figure 1..

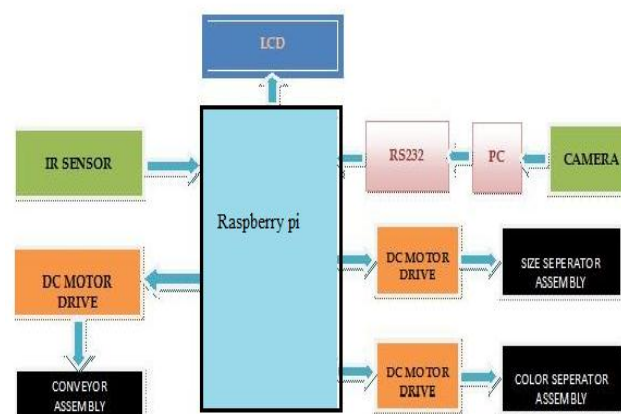


Figure 1: Block Diagram

### V. SYSTEM METHODOLOGY:

The Fig.1 addresses the stream diagram of the created framework. The framework comprises of 3 fundamental stages:

Stage1: Acquiring the picture of the apple:

It includes the catching of the pictures of the apple utilizing camera. In this framework we gathered the quantity of information base of apple natural product pictures that is great and terrible quality pictures. These organic product picture data set are useful for more precise outcome. So in this framework we gathered this hika225apple information base and these pictures utilized as information pictures in this framework.

Stage 2: Image handling:

The picture could be caught utilizing a standard advanced camera. Here we have utilized for catching picture the iball bend cam which is CMOS based camera. The framework course of action is done as displayed beneath the fundamental point is to getting the natural product's elements. The framework comprises of a few stages like element extraction, arranging and evaluating. As proposed in [1], to keep away from shadow, two annular lights are utilized to supply very much disseminated light. The dark foundation tone in picture is simpler to separate the organic product edge characters

later. So the foundation is set dark in entire course of picture catch. The light and camera area is as displayed in Figure 2.

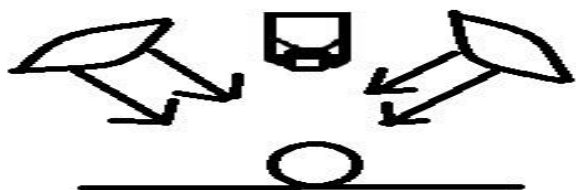
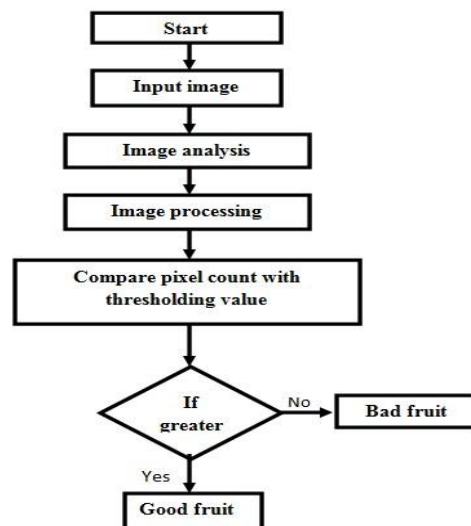


Figure 1: Conveyor

For evaluating utilizing best option camera position is changed so that for catching live picture of an organic product the camera is ceaselessly checking the transport line in video mode, when transport stops as organic product is identified by IR framework camera can catch top view picture of organic product. The dark foundation tone in picture is more straightforward to remove the natural product edge characters later [1] so dark tone is utilized for the transport framework. The caught picture is given as a contribution to the MATLAB programming which separates (identifies) shading and size of a natural product, this information is moved to ARM based framework by utilizing RS232 and com port and likewise control move is made spot, later transport starts and afterward natural product is gathered in fundamental plate of evaluating get together. In the event that natural product is red tone (as identified by MATLAB) the principle plate is moving anticlockwise and in like manner the natural product is gathered in lower plate 1, presently relying upon the size of fruit(as distinguished by MATLAB) it tends to be reviewed as a little or huge organic product. Assuming organic product is of huge size the lower plate 1 will be moving anticlockwise and on the off chance that organic product is of little size the lower plate 1 will be moving clockwise, Similarly, in the event that organic product is of green tone (as distinguished by MATLAB) the principle plate is moving clockwise and appropriately the organic product is gathered in lower plate 2, presently relying upon the size of organic product (as identified by MATLAB) it tends to be reviewed as a little or huge organic product. Assuming that organic product is of enormous size the lower plate 2 will be moving anticlockwise and in the event that organic product is of huge size the lower plate 2 will move clockwise



For a model accept an apple as the handling, as per [1], the apple size is its breadth, which is the longest distance in the apple's cross area. So the recognizing program is centered around how to ascertain the width in an apple side view picture. The natural product picture size distinguishing and evaluating handling stream is displayed in Fig.3

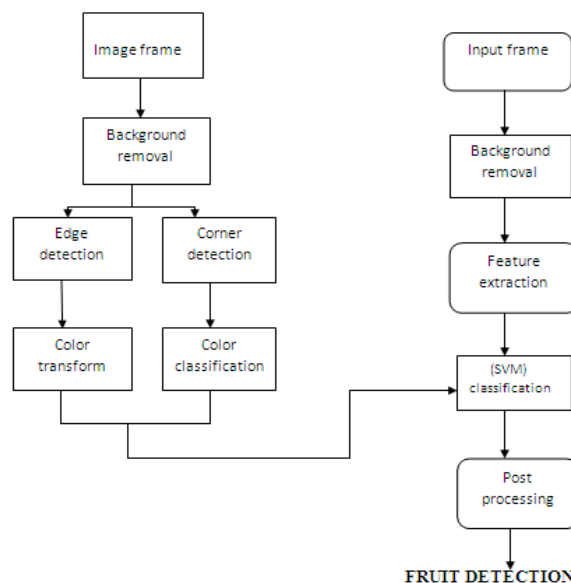


Figure 3:-Process Flow

The course of organic product quality observing is as per the following:

- Shading discovery
- Edge discovery
- Shading evaluating
- Organic product evaluating
- NIR Detection process

Choose an input image from collected database images. Fruit is detected by feature extraction process. The proposed approach in this paper, to play out the examination for picture highlights extricates utilizing following advances.

1. Catch input pictures utilizing camera and collect number of images as a data base images. It includes good as well as bad quality images.

2. RGB picture is changed over to HSV shading space. Then, at that point, lower and upper reaches are characterized. Then, at that point, scopes of double picture are characterized. Then, at that point, convert single channel cover once more into 3 channels.

3. For extricates a hue object to recognized, here we use HSV tone. Limit content to decide the lower/upper edges. HSV tone space is. Likewise give the data about the picture that is, it either present or not in this framework.

4. Utilizing by this information picture we acquire the veil pictures. In cover picture we get highly contrasting hue picture. Location of damaged apple: Find out imperfect apple is one of the most significant preprocessing steps. The absconding skin is determined. A shading picture of the was utilized for the examination. In the event that the pixel esteem is not exactly the chosen edge esteem, it is considered as separated of blemished skin for example awful quality natural product. Any pixel esteem more prominent than the chose limit esteem is a piece of unadulterated skin for example great quality natural product. The picture is cover then unadulterated piece of the picture demonstrated by dark while the harmed ones white. Then, at that point, the absolute number of white pixels are determined which will be equivalent to the all out number of pixels comparing to harmed skin.

In this review, the chance of non-disastrous location of apple pesticide deposits was researched utilizing Vis/NIRS and forecast models like PLSR and ANN. In the first place, Vis/Inspectoral information from 180 examples of non-pesticide apples (utilized as a control treatment) and tests impregnated with pesticide with a centralization of 2 L for every 1000 L between 350-1100 nm were recorded by a spectroradiometer. Then, at that point, they were isolated into two sections: Calibration information (70%) and expectation information (30%). Then, the expectation execution of PLSR and ANN models in the wake of handling was contrasted and 10 otherworldly pre-handling techniques. Ghastly information acquired from spectroscopy were utilized as info and pesticide values got by gas chromatography technique were utilized as result information. Information aspect decrease techniques (head part examination (PCA), Random frog(RF), and Successive expectation calculation (SPA)) were utilized to choose the quantity of primary factors.

Shading Detection during the time spent natural product tone is identified by RGB values [5], here organic products are arranged by shading and size. So for example two natural products are viewed as say tomato having red tone and guava having green tone, so in this progression work will discover shade of a natural product by utilizing RGB upsides of a picture taken from the camera, this picture can be handled by utilizing MATLAB programming and likewise shading can be distinguished for example green or red.

☑ Shading identification calculation:

1) Start

2) Read the information shading picture utilizing imread work.

3) Read the information pixel of shading picture in three distinct planes (RGB) and store it into three variable r, g, and b.

4) Read the little area of organic product to recognize shade of organic product.

5) Store in various variable r1, g1, b1.

6) Calculate the mean of r1, g1, b1 and store into variable r2, g2, b2.

7) Compare the worth with limit.

8) If  $g2 > \text{threshold}$ , Color recognized is green.

9) If  $r2 > \text{threshold}$ , Color recognized is Red.

10) End.

☑ Edge Detection :

Whenever tone is recognized, there is a need to discover size of an organic product. The size of roundabout molded organic product is its width [1]. The edge extraction is key variable for size recognizing. After dim picture, the most remarkable edge-identification technique that observes edge is the watchful strategy.

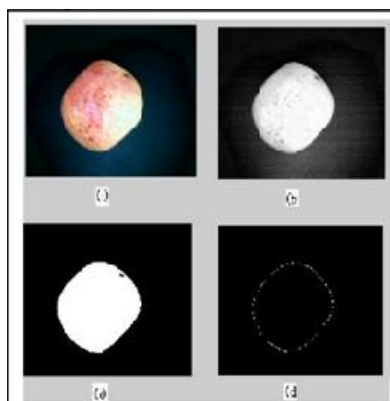


Figure 4: The handling natural product picture. (a) The first picture; (b) dim picture; (c) redirection picture; (d) following

The Canny strategy contrasts from the other edge-location techniques [7] in that it utilizes two distinct limits (to distinguish solid and feeble edges) and remembers the powerless edges for the result provided that they are associated with solid edges. This technique is along these lines more uncertain than the others to be tricked by clamor, and bound to identify genuine feeble edges.

### VI. PROPOSED SYSTEM:

This work is utilized for the two organic products or vegetables recognizable proof and pesticides recognition in them. The framework incorporates two modules.

Module 1 is for the identification of foods grown from the ground. Here a natural product acknowledgment outline work using CNN is proposed. The proposed methodology uses significant learning strategies for the gathering. The work utilizes the natural products size, shading and surface to perceive each image. For preparing and testing, every one of the information pictures were chosen from the 360 dataset which is freely accessible on GitHub and Kaggle. The dataset contains 90,380 distinct products of the soil pictures of 131 classes. A white paper is put back of the organic products as a foundation. Because of the irregularity in the lighting a flood fill type calculation was develop which separate the natural product from the foundation. In the wake of eliminating the foundation every one of the natural products were downsized to 100x100 pixels of standard RGB natural product pictures. Various assortments of similar products of the soil are put away as having a place with various classes. From each class, include extraction of each picture ought to be finished. The component extraction process was finished by three layers of CNN specifically convolutional layer, Pooling layer and amended straight unit layer (ReLU). The convolution layer (CONV) involves channels that achieve convolution tasks as it is scour the contribution regarding its aspects. ReLU layer will apply a component shrewd as displayed in figure 1.[5]

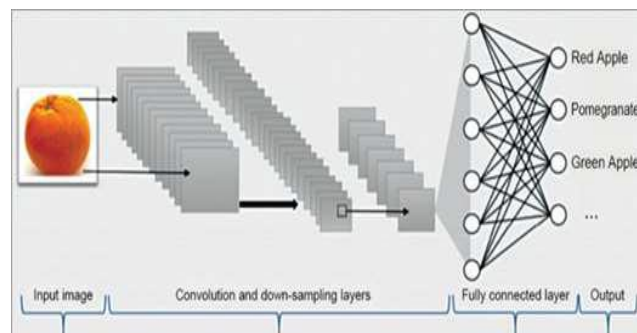


Figure 1 process in CNN

Figure 4: The handling natural product picture. (a) The first picture; (b) dim picture; (c) redirection picture; (d) following

After the association of these three layers, every one of the pictures in the dataset would get resized to same estimations and same channel. A CNN model including this large number of pictures will be made and get saved. Then, at that point, as an info the webcam would catch a picture of the organic product or vegetable that was utilized for the investigation. As clarified before the element extraction of the info happens and the resultant picture would get contrasted and the CNN model that was at that point made and saved. Henceforth the organic product or vegetable utilized get recognized. Result of CNN modules recognize the natural products apple, banana, orange and lemon as displayed in the figure 2.[6]

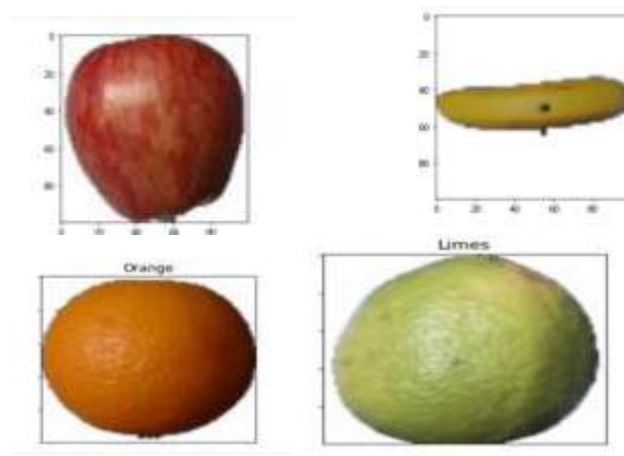


Figure 2 output of CNN module identify the fruits

Module 2 is for the detection of pesticides in fruits or vegetables. In this project three ways are used for the detection of pesticides. Firstly, the NDVI method. The light from LED is made to incident on fruit and the reflected rays from the fruit is received by LDR. The yield from LDR is sent to Arduino. The ADC in Arduino changes the simple qualities over to advanced values. This interaction set rehased multiple times up to really take a look at exactness (for killing blunders). In the wake of finishing this multiple times, an exhibit containing the

qualities would be created and normal of the entire qualities get shown on the screen. A diagram comparing to the qualities got by the rehashed interaction additionally get created.

Second way is utilizing the IR sensors. An IR sensor has 2 sections, the transmitter and the recipient. The transmitter can send light beams of frequency up to 960 nm. The beams from transmitter are made to occurrence on leafy foods reflected beams from the organic product is gotten by beneficiary. An IR recipient can get beams of frequency from 400-1000 nm. The result from IR beneficiary is communicated to Arduino. This cycle set rehashed multiple times up to actually look at precision (for taking out blunders). Here signal investigation happens. Subsequent to finishing this multiple times, a cluster containing the result upsides of Arduino would be created and normal of the entire qualities get shown on the screen. A chart comparing to the qualities got by the rehashed interaction likewise get produced.

Last strategy is by utilizing the gas sensor. One of the legs of sensor ought to be grounded, other would be associated with the Arduino and next is positive. The more synthetic compounds in the natural product, the more there is in the air. This pesticide content gives a decent sign for in the event that a natural product or vegetable is protected or not. The sensor would be now relegated by an edge esteem. On the off chance that the worth got in the trial become more than edge esteem, the natural product contains pesticides in any case not. As that of the past strategies here likewise the interaction got rehashed multiple times and a chart would get created. The rehashed interaction additionally got produced. Analyze every one of the three sensors result and chart plotted as displayed in the figure 3.

Figure 3 chart plotted by three sensors.

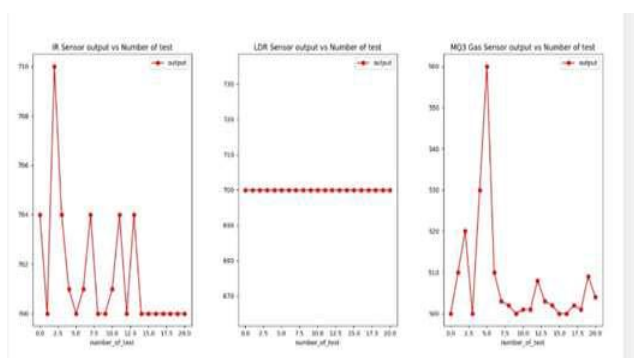


Figure 3: Graph

## VII. CONCLUSION:

The proposed framework is a demo rendition, so for a huge scope creation the quantity of cameras and length of transport framework can be adjusted. This work presents new coordinated methods for arranging and evaluating of various natural products. By and large picture catch is a major test as there is an opportunity of high vulnerability because of the outside lighting conditions, so we are jumping all over dim scale picture which are less affected to the outer climate changes as well as gainful for tracking down size of an organic product. Same way while gathering natural product from transport framework by a principle plate there is variety in the weight estimation of an organic product so further plan can be changed so natural products can be gathered steadily. Speed and productivity of a framework can be additionally improved by involving ARM9 or ARM11 processor for a similar reason.

## VIII RESULTS:

Below figures shows the different screen shots of result which displays real-time monitoring of fruits, giving accuracy value.



Fig1: Banana bad

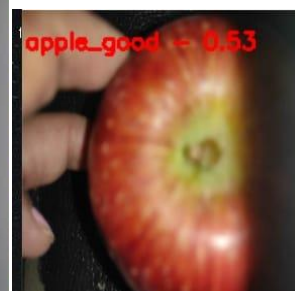


Fig2: Apple good

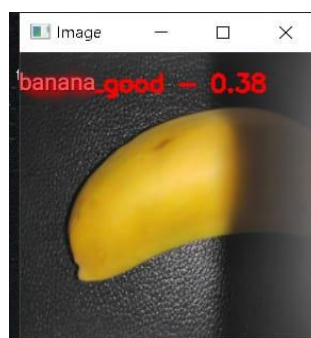


Fig3: Banana good



Fig4: Pesticide banana

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