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# A APPROVED PROCEDURE FOR DETECTING FRUIT DISEASE

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**ABSTRACT:** We introduce a technique which diagnose and classify external disease within fruits. Traditional system uses thousands of words which lead to boundary of language. Whereas system that we have come up with, uses image processing techniques for implementation as image is easy for conveying. In the proposed work, Open CV library is applied for implementation. K-means clustering method is applied for image segmentation, the images are catalogue and mapped to their respective disease categories on basis of color, texture and structure of hole on the fruit. The system uses two image databases, one for implementation of query images and the other for training of already stored disease images. Artificial Neural Network (ANN) concept is used for pattern matching and classification of diseases.

**Keywords:** Open CV, K-means clustering, and Artificial Neural Network.

## I. INTRODUCTION

The studies of fruit or plant can be determined by observable patterns of specific plant and it is critical to monitor health and detect disease within a plant. Through proper management strategies such as pesticides, fungicides and chemical applications one can facilitates control of diseases which interns improve quality. There are various techniques available such as spectroscopic and imaging technology, applied to achieve superior plant disease control and management. With smart farming today's farmer can use decision tools and automation techniques which seamlessly integrate product, knowledge and services for better productivity, grading and surplus yield.

Three fruits namely grapes, apple and pomegranate have been used for research in this paper. Types of fruits and their respective diseases are as follows:

**Black Rot:** The most common and severe disease in grapes is black rot. Fungus damages canes, tendrils, leaves, and fruit in this disease.

**Powdery Mildew:** It is caused by the fungus Uncinulanecat or, sometimes known as Oidium. This fungus only affects grapes and a few other closely related plants.

**Downy Mildew:** It is a grapevine illness that can be extremely harmful. Downy mildew occurs in grape-growing places around the world during bloom, summer, rainfall, and if the temperature rises beyond 10°C (50°F).

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| GRAPES | APPLE | PROMEGRANATE |
|---|---|---|
| Black Rot | Apple Scab | Bacterial Blight |
| Powdery Mildew | Apple Rot | Aspergillus Fruit Rot |
| Downy Mildew | Apple Blotch | Gray Mold |

**Table 1: fruit and its diseases**

**Apple Scab:** Apple Scab is the most dangerous type of apple illness. It can be found across the apple-growing regions.
**Apple Rot:** It is a fungus caused due to Botryosphaeriaobtusa. It attacks on leaves, bark and fruits of apple tree.
**Apple Blotch:** In the northwest, apple blotch is the most frequent "summer illness.

**Bacterial Blight:** This disease was first recorded in Delhi (India) in the year 1952. Until 1998 Bacterial Blight was considered a lower economic threat Sepals, twigs and pomegranate are affected by Bacterial blight. Fruits crack due to this disease.
**Aspergillums Fruit Rot:** It appears when the bloom opens after rain and infects the pomegranates.
**Gray Mold:** Gray mould is also known as Botrytis cinerea. This pathogen is more active during post-harvest washing and spreads more easily when maintained at room temperature. Gray mould attacks the pomegranate flower and affects the fruit till it ripens.

## II. LITERATURE SURVEY

***[1] Image Processing for Smart Farming: Detection of Disease and Fruit Grading, Authors (Monica Juries, Aswan Kumar, And Rushikesh Bores), 2013:***

As there is a need of high yield in agricultural industries improved yield of fruit is important, for this there is a need of automated technique which will find disease on fruits. For this artificial neural network methodology is suggested which can be helpful to categories fruit infection. K-Means clustering is applied to find diseased area on the fruit but it has disadvantage of sizable estimation load. It will encourage a agronomist to build better production and make correct time to time judgment.

***[2] A Review of Image Processing for Pomegranate Disease Detection, Authors (Manisha. Bhangs, Prof. H. A. Hingoliwala), 2015:***

The process suggests a solution for the recognition of pomegranate fruit disease. In this process, web based technique is applied to help non experts in identifying fruit diseases which depends on the picture representing the symptoms of the fruit. Farmers can take image of fruit disease and upload it on the system. After this farmers would be able to see if the fruit is affected by bacterial blight or not.

***[3] A Cost Effective Tomato Maturity Grading System using Image Processing for Farmers, Authors (SudhirRao Rupangadi, Ranjani B.S., Prathik Nagaraj, Varsha GBhat),2014:***

This system classifies ripeness of fruit based on its color or texture. It involves current techniques mainly manual inspection which leads to errorious

classification; it results in economic losses due to inferior produce in the market chain. The short comings are several methodologies which require highly expensive setups and complicated procedures; overall accuracy is achieved up to 98%.

***[4] Adapted Approach for Fruit Disease Identification using Images, Authors (ShivRamDubey, Anand Singh Jalal):***

This adaptive approach is validated on the basis of experiments. The approach consists of steps and that are stated as; first step is k-means clustering technique which is applied for defect segmentation and second step involves some state of art features that are extracted from. Segmented image and then segmented image are classified into one of classes with the help of multi-class support vector machine. It achieves precision up to93%.

***[5] Fruit Detection using Improved Multiple Features based Algorithm, Authors (Hetal N. Patel, Dr. R.K. Jain, and Dr. M. V. Joshi), 2011:***

This gives improved solution for locating the fruits on the plant based on multiple features. Multiple feature extortion technique can include steps like extraction of color and intensity feature, extraction of orientation feature, extraction of edge feature, extraction of area from feature maps. The process is entirely automatic and it can work without user involvement. To improve output, it considers numerous features.

## III. EXISTING METHOD

Now-a-days as there is prohibitive demand for agricultural industry, effective growth and improved yield of fruit is necessary and important. For this purpose farmers need manual monitoring of fruits from harvest till its progress period. But manual monitoring will not give satisfactory result all the times and they always need satisfactory advice from expert. So it requires proposing an efficient smart farming technique which will help for better yield and growth with less human efforts. We introduce a technique which will diagnose and classify external disease within fruits. Traditional system uses thousands of words which lead to boundary of language. Whereas system that we have come up with, uses image processing techniques for implementation as image is easy way for conveying.

## IV. PROPOSED METHOD

In the proposed work, Open CV library is applied for implementation. K-means clustering method is applied for image segmentation, the images are catalogue and mapped to their respective disease categories on basis of color, texture and structure of hole on the fruit. The system uses two image databases, one for implementation of query images and the other for training of already stored disease images. Artificial Neural Network (ANN) concept is used for pattern matching and classification of diseases.

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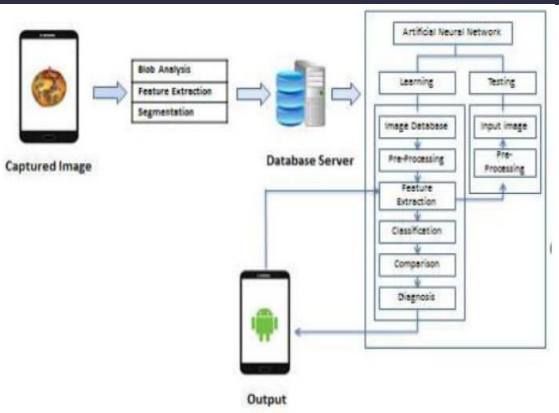


**Figure 1: Architecture of proposed method**

## V. IMPLEMENTATION

**Image Acquisition: -** Image acquisition can be broadly defined as the process of restoring an image from some source, usually a hardware-based source, which can be carried out concurrently with other processes. Because processing is only feasible with the help of a picture, image acquisition is always the first condition for the work flow sequence of image processing [5]. The image obtained is completely natural, and it is the result of any hardware that was used to create it.

**Image segmentation: -** It is a technique for dividing a digital image into many segments. The main goal of segmentation is to clarify and/or alter an image's depiction into something more relevant and easier to analysis. Image segmentation is used to locate objects and image border lines. For allocating a label to each pixel in an image, pixels with comparable label portions share differentiating qualities. We're using the K-Means Clustering approach for this [4].

**Feature Extraction: -** The colour, texture, morphology, and structure of the fruits' holes are all taken into account. Occasionally, massive resources are necessary to describe large data sets [2].

The following is the algorithm for obtaining the features:

The features are extracted using the SURF (Speed up Robust Feature) technique. As a local descriptor and blob detector, the SURF technique was used

$$S(x,y) = \sum_{i=0}^{x}\sum_{j=0}^{y} I(i,j)$$

The sum of the primitive image inwards a rectangle can be quickly determined using the integral image, but it requires four calculations at the rectangle's intersection.

Algorithms are generally classified as follows:

1. Scope point Detector

2. Local surrounding Detector

3. Matching

**Blob Analysis -** Blob detection methods are designed to recognise a region of interest surrounded by a digital image that differs in attributes, such as colour or brightness, from its surroundings. Blob is a term used to describe a region of an image where some attributes are nearly constant [8].

The Blob Analysis solution's basic scenario consists of the following stages:

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**1. Extraction:** This is the first stage in the picture there holding approach, and it involves inspecting a region that corresponds to a single object or several objects.

**2. Refinement:** Due to the decreased image quality, the extracted region contains a variety of loud sounds. In the refinement process, approaches for region transformation are applied.

**3. Analysis:** This is the final stage of the refined region's evaluation and computation. Divide the region into several blobs for investigation if it contains many objects.

Pattern Matching is the process of checking for the presence of elements of a pattern in specified sequences of tokens. The artificial neural network (ANN) idea is used in the suggested system for pattern matching, which interns classifies illness[3].Artificial neural networks can be used to accept pattern comparisons.

**Algorithm:**

Input–Images of Various Fruits

Output–Detection of Fruit Disease

**Step1:** Accept image using android phone from user:

**Step2:** Extraction of Feature Vectors

$$E(n) = [C(n) + M(n) + T(n) + H(n)]$$

Here, C=Color M = Morphology T=Texture H=Structure of Hole E=Extraction of features n= No. of images

**Step3:** Calculating: Let E (n) be set of Extracted Images and

If<Fruit Detected>

Then E(n)

Else

Reject

**Step4:** Pattern Matching: Let T be set Trained Database

If<E (n) ==T>

Then

Classification

Detection

Else

Go To Step (2)

**Step5:** Stop.

| S.NO | Username | Password | Upload Image | Predicted output |
|---|---|---|---|---|
| 1 | Suresh124@gmail.com | ********* | Pic.jpg | Apple rot |
| 2 | Nainakumari9@gmail.com | ********* | 20220411_204600.jpg | Powdery Mildew |
| 3 | Lalith473@gmail.com | ********* | 20220131-WA01.jpg | Black Rot |
| 4 | Student213@gmail.com | ********* | Grape.jpg | Gray Mold |
| 5 | Geethika78428@gmail.com | ********* | 20220765_2049909.jpg | Bacterial Blight |

**Table1: Sample data along with prediction**

Table [1] provides a sample of data from people who have signed up for this simple application. The user can easily input photographs and anticipate disease using the

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applications. Belongs to apple, promogranate, and grapes will be the most common disorders [6]. There are various types of users. In most cases, it will make it easier to diagnose the sickness. The application will be well-trained to forecast which type of fruit image can be put based on the respectable results. Along with this figure [1], which depicts how it will be trained and validated, both will play a significant role. The accurate results will be displayed to the user who has registered.

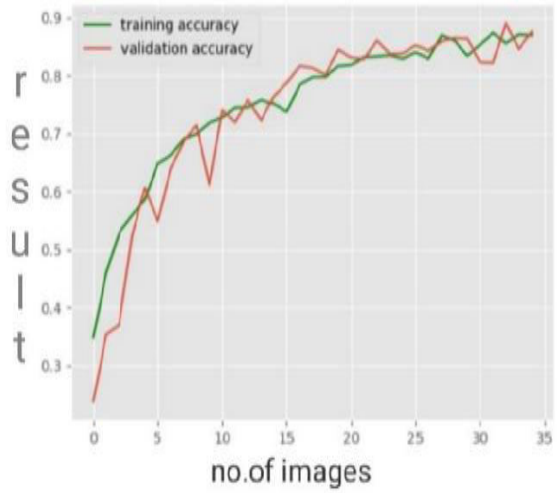


**Figure1: Performance of fruit disease**

## CONCLUSION

The unique result implies that the enhanced approach is worthwhile, since it can clearly assist accurate fruit disease diagnosis with minimal computational effort. Future research will focus on automatically determining the severity of the condition. For the identification of grape, apple, and pomegranate fruit disease, an image processing-based approach is provided. The diseases Black Rot, Powdery Mildew, and Downy Mildew in grapes; Apple Scab, Apple Rot, Apple Blotch in apples; Bacterial Blight, Aspergillus Fruit Rot in pomegranates; and Gray Mold in pomegranates are found and classified. Once diseases have been identified, appropriate therapies are suggested. It will also encourage Indian farmers to practise smart farming, which allows them to make timely decisions, saving time and reducing fruit loss due to illness.

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