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A Review of Image Processing for Pomegranate Disease Detection

Manisha A. Bhange, Prof. H. A. Hingoliwala

Department of Computer Engineering, JSCOE PUNE
Pune, India

***Abstract*— In this paper, we suggest a solution for the detection of pomegranate fruit disease (bacterial blight) and also the solution for that disease after detection is proposed. Bacterial Blight need to control at primary stages otherwise it will lead to economic loss. Web-based system used to help non experts in identifying fruit diseases, based on the picture representing the symptoms of the fruit. Farmers can take the photo of the fruit disease and upload it to the system. Then system will show to the farmer is the fruit is infected by the bacterial blight or not. We have added new approach of IntentSearch in this system that is useful when quality of input image is poor.**

The image processing based proposed system uses two image databases, one for training and other for testing. The images are classified and mapped to their respective disease categories on basis of three feature vectors namely, color, texture and morphology.

***Keywords*— IntentSearch, bacterial blight, morphology, color, texture.**

I. INTRODUCTION

India is developing country. In this development contribution of agricultural field is major. Smart farming is about empowering today's farmers with the decision tools and automation technologies that seamlessly integrate products, knowledge and services for better productivity, quality and profit.

The classical approach for detection and identification of fruit diseases is based on the naked eye observation by the experts. In some developing countries, consulting experts are expensive and time consuming due to the distant locations of their availability. Automatic detection of fruit diseases is essential to automatically detect the symptoms of diseases as early as they appear on the growing fruits. This system helps to detect the diseases of fruits easily. By using this system we can avoid the economical loss of farmers.

Some systems has covered apple, mango and grapes etc. There are so many fruits still remaining that are exported from India and give more profit to the farmers need to be covered under automatic fruit disease detection system. Pomegranate is the one of the fruit that is taken in the low rain area region of the Maharashtra state of India. Now days this fruit is under the attack of one major disease called Bacterial Blight due to which farmer's faces economical loss. This disease is more powerful in the cloudy environment and in the rainy season. Symptoms of bacterial blight on young and developing pomegranate fruits are initially, spots are black and round and surrounded by bacterial ooze. Under favorable conditions, spots enlarge to become raised, dark brown lesions with indefinite margins that cause the fruit to crack. The disease may cause up to 90% yield reduction.

This disease need to be controlled in the primary stage of the infection otherwise it will difficult to control it in the final state. Due to the lack of knowledge farmers are not able to identify it exactly at the primary stage.

Automatic fruit disease detection system takes the input image and show the results directly to the farmer. But if the image taken by farmer having the poor quality in that case the results shown by the system may not be accurate. So we are adding Intent search technique into the system and will help to find the user intension of disease search. It will also help increase the accuracy of the system.

FIG. 1 BACTERIAL BLIGHT ON POMEGRANATE FRUIT AND LEAF

II. LITERATURE SURVEY

Tejas Deshpande (2014) proposed an automatic grading of disease on the pomegranate plant leaves. Bacterial blight disease is chosen for the research work. Manual grading is time consuming so automatic grading system becomes beneficial. K-means clustering method is used for conducting image segmentation and disease detection. Total leaf area (At) and total disease area (Ad) is calculated. After calculating At and Ad, disease grading has been done [1].This system is useful for plant pathologists and not for the farmers directly.

In [2] Monika Jhuria , Ashwini Kumar (2013) suggested an image processing approach for detection of disease and fruit grading. The major goal of research work is to analyze

disease on fruit/leaf of fruits and provide alternative solutions. The work has done on fruits namely Apple and grapes. Image processing techniques are used for fruit disease detection and for calculation of weight of fruit. Color, Texture and morphology features are considered for feature extraction. Artificial Neural network is used for image classification. Back propogation technique is used for weight adjustment of images stored in training database. The fruit grade is decide on the basis of disease spreading and weight of fruit.

In [3], Jagdish Pujari (2013) used some statistical methods for detecting fruit fungal disease. The fruits choosen for research work are namely Pomegranate, mango and grapes. Two phases are used for image preprocessing. In first phase, input image is preprocessed for binarization and noise removal. In second phase image is thinned and bounding box is generated. Block wise feature extraction technique is used for feature extraction. In this technique image is divided in 5*5 blocks. Textual features are extracted using GLCM (gray level co-occurrence matrix).

In [4] Shiv Ram Dubey (2012) proposed an image processing approach has been used for fruit disease identification. The research has conducted for apple disease namely apple scab, apple rot, apple blotch. K-means clustering technique is used for image segmentation. Feature extraction is done from segmented images. Features considered for feature extraction are color histogram, color coherence vector, local binary patterns and complete local binary patterns. Multiclass support vector machine is used for fruit disease identification.

Ilaria Pertot(2012) provided multilingual web-based tool for visual plant disease identification. The system has 2 users. User who can use disease identification process for diagnostic and super user who can update system (add/delete/ modify images, disease). This system is developed for identification various diseases on strawberry. The grower in the field analyze the symptomic plant and compare symptoms on plant with imags provided by web-based system. The system responds with identification of most probable disease[5].

III. The Proposed System

The framework of proposed approach are shown in fig 2. For detection of fruit disease, two image databases are required, one for training purpose and other for testing.

For fruit disease detection , Image preprocessing is required for enhancing images. The next step is image segmentation is required; otherwise the feature of non-infected region will dominate over the feature of infected region. After segmentation, feature extraction is done from segmented image and finally the training and classification are performed.

Each step of proposed system is discussed in this section.

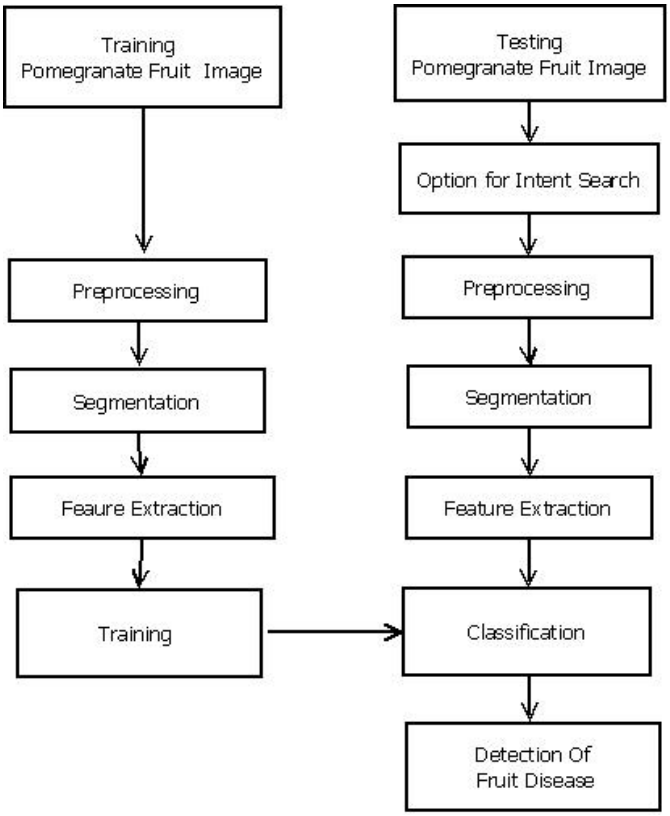

FIG. 2. FRAMEWORK OF PROPOSED SYSTEM

A. *Image Preprocessing*

Image pre-processing involves removing low frequency background noise, normalizing the intensity of individual particles images, removing reflection and masking portion of images [6]. It is the technique for enhancing data images prior to computational processing.

Pre-processing required for shadow removal, image correction. Shadow removal is very important because shadow may disturb segmentation and feature extraction.

B. *Feature Extraction*

It is the process of generating the features to be used in selection and classification. Color, Morphology and Texture feature vectors are used for feature extraction.

1) *Color*: A color feature is one of the most widely used visual feature. Color image processing is categorized into three principle areas:

- Color transformation
- Spatial processing of individual color planes
- Color vector processing

We are going to use HSI (hue, saturation and intensity) color model for the representation of color of an image.

A color histogram represents the distribution of color in image. Here, we will compute color histogram for all images in database and save in database which can be used for comparison of query image with database image.

2) Morphology: Morphology is tool used for extracting image components. These image components are useful in description and representation of region shape such as boundaries. By using morphology, we will extract disease shape vector from healthy fruit and leaf. We are using erosion concept which is fundamental operation of morphology for obtaining the boundaries of images.

3) *Texture:* Texture describe visual patterns ,each having properties of homogeneity. Image texture provide information about spatial arrangements of color of an image.

C. Training and classification

We will use K-means clustering alogorithm for image segmentation. After that we will apply K-means to entire training data set.

K-nearest neighbour algorithm is proposed for classification. Clusters will classify in two classes i.e. one class will consist diseased fruit images and another class will consist non-diseased images. This will be used for further recommendation.

D. IntentSearch

We are going to add this as new module in the proposed system. IntentSearch helps to capture the intension of the user while searching the information related to his fruit diseases. This module going to play major role when the quality of the input image is poor. In such case, the final result we are getting from the system may be poor. When user give his image input to his intent search module, it gives as output the number of images that are similar to the input image from the database. Then user has to click on the one image which he feel similar to his fruit diseases. That selected image by user is taken as input for the system. If the quality of input image is good in that case user may be skipping the IntentSearch. Selection of IntentSearch procedure is optional.

IV. CONCLUSION

An image processing based solution is proposed for detection of pomegranate fruit disease. Bacterial blight disease is identified on pomegranate fruit and leaf. Once the disease is detected proper treatment can be suggested. The proposed system consist pre processing, segmentation, feature extraction ,training and classification.

The existing system providing the solution that are not directly to farmers. This system will provide immediate solution to farmers which is time saving and reduce loss of fruits due to disease. The main purpose of this paper is to improve the efficiency of automatic fruit disease detection system by adding IntentSearch technique

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