

Identification of Diseases on Pomegranate Fruit by Image Processing Techniques

^[1] D. S. Gaikwad ^[2] K.J. Karande, ^[3] S.V. Surwase
^{[1][2][3]} S.K.N. College of Engineering, Pandharpur
 Maharashtra (India)

Abstract- Diseases in fruit causes foremost production and financial losses in farming trade widespread. Present paper gives system to automatically detect the diseases on pomegranate fruit. Image processing is used to examine the diseases on pomegranate fruit. For classification of images support vector machine concept is used. The contaminated pomegranate fruit shows a precise symptoms colored spots that will occur on the pomegranate fruit. Segmentation is used to discover spot in the diseases image that is qualified as diseased area. The bacterial blight and anthracnose fruit spot diseases on pomegranate fruit have been preferred

Keywords: diseases detection, segmentation, , image processing, bacterial blight and anthracnose.

I. INTRODUCTION

Pomegranate (*punica granatum*) is one of the majority important fruit crop of India. The export of the pomegranate fruits is about 35,000 tonnes/annum. We export pomegranates mostly to Bahrain, Kuwait, Oman, Saudi Arabia, U.A.E, Netherlands etc. varieties which are in order globally include Ganesh and Aarakta. The significant cultivated varieties in India for instance Alandi or Vadaki, Ganesh, Aarakta, Dholka, Kandhari, Kabul, Muskati Red, paper Shelled, Spanish Ruby etc. As per details of National Horticulture Board of India, there is a undersized decline in the area of pomegranate development in India. There is scope for Indian pomegranates vend to other countries. As per recent information on crop and fruit health and disease detection can help the control of diseases through image processing technique [1]. Last few years for disease detection different techniques have been used for example spectroscopic, molecular and volatile organic compounds profiling based etc. The spectroscopic and imaging technology could be incorporated with an autonomous agricultural vehicle for reliable and real-time plant disease detection to get greater plant disease control and management [2]. Diseases on pomegranate fruit causes financial losses in farming business globally. Main cause of fruit diseases are fungus, microorganisms and viruses. Also there are further diseases which are caused by pitiable environmental situation. Diseases on pomegranate shows definite symptoms, so it is most important to investigate the diseases in early stage. The ability of disease analysis in earlier stage is an important task. It is our duty to motivate the farmers for accepting recent trends and technologies.

The idea of this paper is to examine majorly affected bacterial blight and anthracnose diseases on the pomegranate fruit and recommend solution to the farmers for identification of diseases by image processing techniques. Fig.1a and 1b shows bacterial blight and anthracnose diseases on pomegranate fruit.



Fig 1.a. bacterial Blight and b. Anthracnose on pomegranate fruit

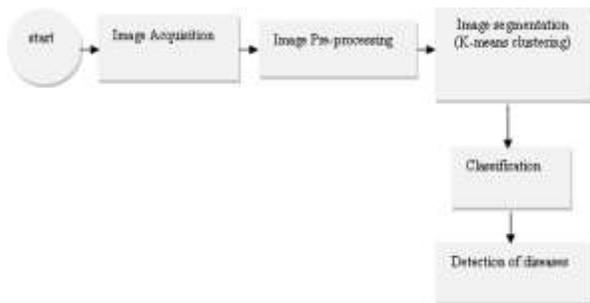
Encouraged by [4] [5]&[7], we develop model that automatically detect the bacterial blight and anthracnose diseases on pomegranate fruit. If black spots are found

II. METHODOLOGY

The study of the present work has been presented pictorially in Fig.2. Seventy five images are used for learning of the system. Practical analysis is divided into on pomegranate fruits and cracks are passing through these spots then the disease recognized would be bacterial blight. From these two characteristics bacterial blight on pomegranate can be correctly identified. Anthracnose shows tiny reddish brown circular spots on the fruits. As the

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disease advances these spots, merge to form bigger patches and the fruits start rotting. The arils get affected which become muted and become flaccid for use.



The following steps: (1) Image acquisition (2) Image Pre-processing (3) Image segmentation (4) Image classification and Diseases detection.

A. Image acquisition

First step of any visualization scheme is the image acquisition stage. The digitization and storage of an image is referred as the image acquisition [8]. To achieve projected task it is most important that images

B. Image pre-processing

The reason of pre-processing is to eliminate the noise from the image. This is vital for the reliable

C. Image Segmentation

Image segmentation is a suitable and efficient technique for detecting forefront things in images with fixed background. K-means clustering algorithm has been used in this work to identify the diseases areas should obtain adequately. The work begin with collecting images from National Research Center for Pomegranate in Solapur, Maharashtra, India. All the images are saved in the JPEG format segmentation as segmentation algorithms gives poor results in the presence of noisy background.

MATLAB is used to implement the image segmentation algorithms. K-Means Clustering is a method of cluster analysis which aims to separate n comments into k equally elite clusters in which each inspection belongs to the cluster with the adjacent mean[6]

D. Image classification & Disease Detection

Once the segmentation is done, the clusters contains the diseased spots being extracted, then next step is to discover whether the pomegranate fruit image contains any diseases or not, i.e. the image has to be classified as either healthy or diseased. classification is performed by using support vector machine as a classifier. support vector

machine has high accuracy and simple geometrical interpretation.

SVM work on two mathematical operations (1) Nonlinear mapping of an input vector into a high-dimensional feature space that is hidden from both the input and output.(2) Construction of an optimal hyperplane for separating the features discovering in step 1(9).

III. RESULTS AND DISCUSSIONS

From the result, classification of type of disease and accurate values of percent-infection are obtained with the help of developed software. First query image is fed to the classifier. support vector machine has high accuracy and simple geometrical interpretation.

SVM work on two mathematical operations (1) Nonlinear mapping of an input vector into a high-dimensional feature space that is hidden from both the input and output.(2) Construction of an optimal hyperplane for separating the features discovering in step 1(9).



Fig.3. Fruit disease detection for healthy fruit image

Enhanced image is segmented to find the diseased part. The Fig.3. shows there is no disease infection on healthy pomegranate fruit

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Fig.4. Disease detection for bacterial blight infected fruit

Figure.4 shows the result of bacterial blight disease. It shows the black mark passing through the cracks. infected region found to be 18.9309% with 98.3871% detection accuracy



Fig.5 Disease detection for anthracnose infected fruit.

And Fig.5 shows that the disease is classified according to the symptoms i.e. anthracnose diseases infected regions found to be 21.9792 % with 98.3871 % detection accuracy.

IV CONCLUSION

The developed network can successfully identify the diseases on pomegranate fruit. With the help of image processing a method for pomegranate disease identification was achieved. Through research and experiments, it has been observed that the results found are exact, true and adequate. Also it is observed that the healthy fruit, bacterial blight and anthracnose diseases are detected and classify to their respective diseases category with an accuracy of 98.3871%. Once the disease is identified right treatment suggested to avoid more loss.

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