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A REVIEW ON POMEGRANATE DISEASE DETECTION BY USING IMAGE PROCESSING

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ABSTRACT: -

The studies of the pomegranate plant diseases means the studies of visually observable patterns seen on the plant. It is very difficult to monitor the pomegranate plant diseases manually.Hence, image processing is used for the detection of pomegranate plant diseases.To overcome disadvantages of traditional eye observing technique, we used digital image processing technique for fast and accurate disease detection of plant.Image processing is a best technique for agricultural application. Image processing can detect a pest's attack from the image of plant. The detection and classification of plant diseases are important task to increase plant productivity. In such cases, automation of disease detection is essential.This paper presents the study of various image processing techniques and applications for pest identification and plant disease detection.

KEYWORDS: *Digital image processing, automation.*

I. INTRODUCTION

Pomegranate is a small tree, measuring less than 4 m when cultivated although it can reach 7 m in the wild. Some trees may live longer than 100 years. The root is knotty, consistent and reddish, well developed and extremely absorbent in saline soils.The leaves in vegetative or mixed clusters measure about 2 to 9 cm in length and 1 to 3 cm in width. They are entire, smooth, opposed, with no stipule, sometimes verticillate, hairless, oblong, deciduous and with short petioles. The flowers appear singly or in small clusters generally of 2-7 flowers,occasionally at the end of the branch but sometimes on the auxiliary buds.The ripe fruit is greenish yellow or brown with reddish areas which may occasionally occupy the whole surface of the fruit. Image processinginvolves capturing the image and applying various preprocessing techniques and detects the pest in the image. By using the classifier we can classify the pests and plant diseases.

Diseases and insect pest are the major problems in the agriculture. These require careful diagnosis and timely handling to protect the crops from heavy losses. The naked eye observation is the commonly used method for detection of pest and identification of plant diseases. This needs continuous monitoring. But it is not practical in the case of large farm. Also it is not accurate, expensive and time consuming.

Diseases and insect pests are the major problems that threaten pomegranate cultivation. These

require careful diagnosis and timely handling to protect the crops from heavy loses. In pomegranate plant diseases can be found in various parts such as fruit, stem and leaves. Major diseases that affect pomegranate fruit are Bacterial Blight, Alternaria and Phomopsis.Currently, the pomegranate farmer determines the type of disease manually. The errors might occur in order to determine the type of diseases. Pomegranate farmers also have to spend a lot of time to detect the type of disease. There are various methods to detect plant pathologies. Some diseases will not have any visible symptoms associated with each of them, or in some cases, the symptoms are discovered when it is too late to react and to stop the disease from spreading. In those cases, some kind of sophisticated psychoanalysis [1] with a powerful microscope is necessary.

II. LITERATURE REVIEW

In Detecting the plant diseases and issues by image processing technique and broadcasting[2] by K. R. Gokulakrishnan, Kapilya, authors provided awidespread and detailed study of the subject, which aims atdetecting the structure and diseases of plants through a cloudcomputing way and broadcasting the views to the user faraway.

Image Processing System for Plant Disease Identification by Using FCM-Clustering Technique[3] by Megha S.,Niveditha C.R.,Sowmyashree N.,Vidhya k. This paper presents an improved method for plant disease detection using an adaptive approach. This approach helps to increase the accuracy of the disease level, it provides various prevention methods (type and amount of pesticides to be used), the level of destruction and helps to check whether the disease spreads or not. But disadvantage of this method is we cannot identify the disease at an early stage.

In Disease Detection in Pomegranate Leaf Using Image Processing Technique[4] by Sowmya GM,Chandan V,SampathKini paper authors proposes a methodology for detecting plant diseases early and accurately, using diverse image processing techniques.The work begins with capturing the images filtered and segmented using median filtering method. Then colour and texture features are extracted from the result of segmentation. Classification is done to detect the type of disease the leaf has been affected. Advantages of this work are it shows preliminary and final results instantly,user-friendly, accurate, fast, efficient and effective solution to the problem,provides an instant analysis of the quality of product by finding different diseases in pomegranate leaf. But there are some disadvantages as

This requires continuous monitoring of experts which might be prohibitively expensive in large farms, it is very costly depending on the system used, the number of detectors purchased. This makes consulting experts too expensive and time consuming and more over farmers are unaware of non-native diseases.

A paper on A Hybrid Intelligent System For Automated Pomegranatedisease Detection And Grading[5] by Sannakki S.S., Rajpurohit V.S., Nargund V.B., Arun Kumar R. And Yallur P.S. proposes a system which is an efficient module that identifies various diseases of pomegranate plant and also determines the stage in which the disease is. The system employs various image processing and machine learning techniques. Once the disease and its stage are identified accurately, a proper disease treatment advisory can be provided. This ultimately supports farmers during their daily struggle against disease outbreaks.

In reference Congress on Signal and image processing [6] by Tian Youw, Li Tianlai, NiuYan,a new method of recognizing cucumber leaf disease based on computer image processing and SVM was studied to improve recognition accuracy and efficiency. For detecting diseases of the plants early and accurately, the authors have used image processing and classification techniques. At first, diseased images are acquired using cameras or scanners and vector median filter was used to remove the noises.

Secondly, disease spots were segmented from the background using statistic pattern recognition. Later color, shape and texture features were extracted. Finally, classification method, named support vector machine was used to classify diseased images. The experimental results of recognition of cucumber disease by SVM showed that correct recognition rate of both using shape feature and texture feature is higher than that of shape feature only.

A paper on Segmentation of Pomegranate Leaf for Detection of Disease Using Image Processing[7] by T. N. Shaikh, Dr.S.M. Mukane describes a method which consists of preprocessing and segmentation phases. In the

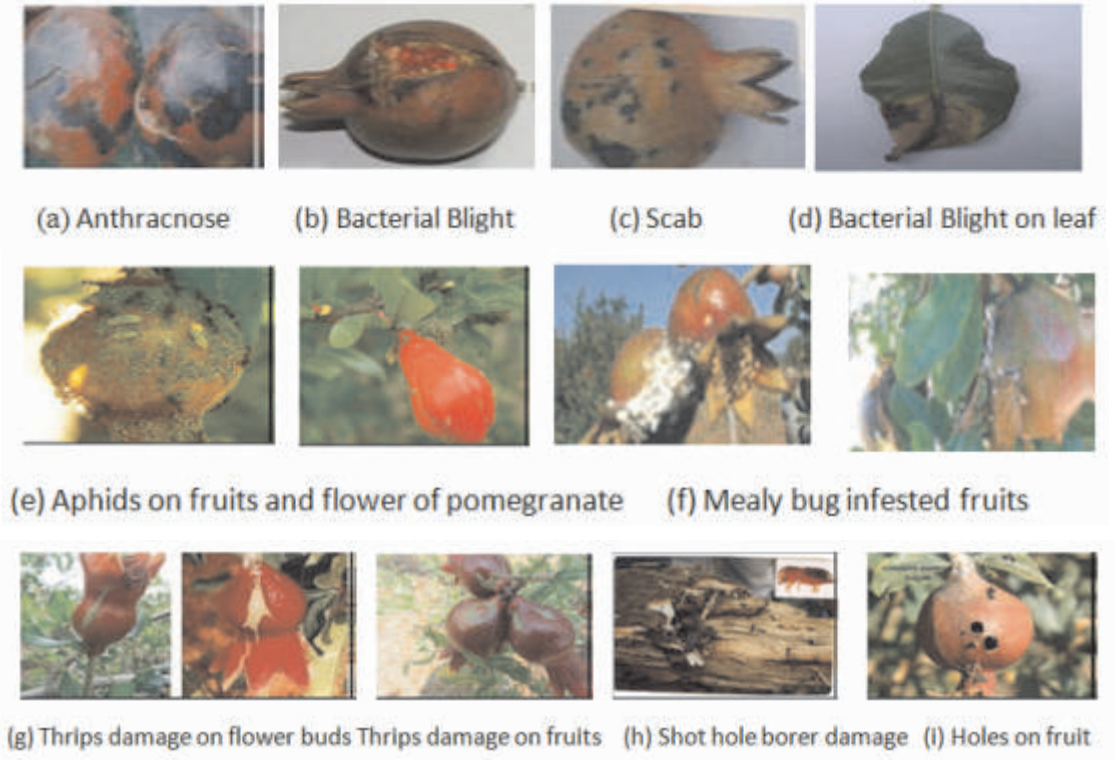
preprocessing phase, from a given set oftraining images noise removal and histogram is calculated. Images are segmented using k-means clustering. The use of a k-means clustering for leaf disease detection and segmentation has been demonstrated. The database image is preprocessed. Own database of leaf of 2 classes. One healthy and another is unhealthy, each containing 10 leaf images has been created. It has been found that segmentation offers the leaf image into no of sub images containing the disease. From this we can easily detect the disease.

A paper Fast and Accurate Detection and Classification of Plant Diseases, [8] by H. Al-Hiary, S. Bani-Ah Mad, M. Reyalat, M. BraikAnd Z. A Lrahamneh build a model by using three techniques 1) K-means Clustering. 2) color co-occurrence methodology for texture analysis. 3) Neural Networks. These models are tested upon the wide range of disease and give the good results. It could be improved to increase the recognition rate of classification.

A paper on Pomegranate Leaf Disease Detection Using Support Vector Machine [9] by Shivaputra S.Panchal1, Rutuja Sonar, proposes a method in which K-means clustering algorithm is used for segmentation and classification is done by the support vector machine. The statistical parameters are used as features for classification.

III. RELATED WORK

Pomegranate diseases-



1) acterial Blight- Bacterial blight is the most severe disease of thepomegranate. The disease symptoms can be initiallyfound on stem part which gradually pervades toleaves and then to fruits. On stem, the disease startsas brown to black spot around the nodes. In advance stages of nodal infection girdling andcracking of nodes lead to break down of branches.On leaves, the disease starts with small, irregular,water soaked spots that are 2 to 5 mm in size withnecrotic centre of pin head size. Spots aretranslucent against light. Later, these spots turn lightto dark brown and are surrounded by prominentwater soaked margins. Numerous spots maycoalesce to form bigger patches.

2) Alternaria: small reddish brown circular spots appear on the leaves.

3) Anthracnose: Appears as small regular or irregular dull violet or black leaf spots with yellowish halos. Leaves turn yellow and fall out.

4) Cercospora: Leaf spots are minute, brown with yellow halo. Spots are scattered, circular or irregular and become dark brown with age.

5) Anar butterfly/ Pomegranate fruit borer-It is mostly prevalent during the 'mrig' bahar season (June to February). Fruit injury revealed at the age of 30—50 days.

- Caterpillar bores into young fruits.
- Feeds on internal contents (pulp and seeds)
- Fruit rotting and dropping may occur

6) Stem borer-Pale yellowish- brown body with light grey elytra and are 30 to 35 mm long. The beetle emerges by eating a circular hole through the bark. Adult beetles are 1.1/4 to 1.1/2 inches long, dull, yellowish-brown, the sides of the body and legs bluish, elytra yellowish-grey with a large number of black spots varying in size from a pin's head to minute specks. There is only one generation per year and longevity of beetles is 45 to 60 days.

7) Whitefly- Damage symptoms:

- Nymphs and adults suck the sap from leaves
- Honey dew - development of sooty mould fungus
- Yellowing of leaves.
- Dropping of affected leaves.

8) Shot hole borer- They survive in temperatures ranging from -26 to 15°C. The flight activity is greatest late afternoon or early evening and the beetles usually fly at or below 15 ft .

Damage symptoms:

- Adult females bore into the basal part of the stem and roots.
- Causes small shot holes on roots, main trunk, wilting and finally leads to death of the tree.

9) Thrips-The incidence of this pest is mainly seen from July to October with the peak period in September.
Damage symptoms:

- Both nymphs and adults feed on the underside of the leaves by rasping the surface and sucking the oozingcell-sap.
- Leaf tip turn brown and get curled, drying and shedding of flowers and scab on fruits which willreduce the market value.

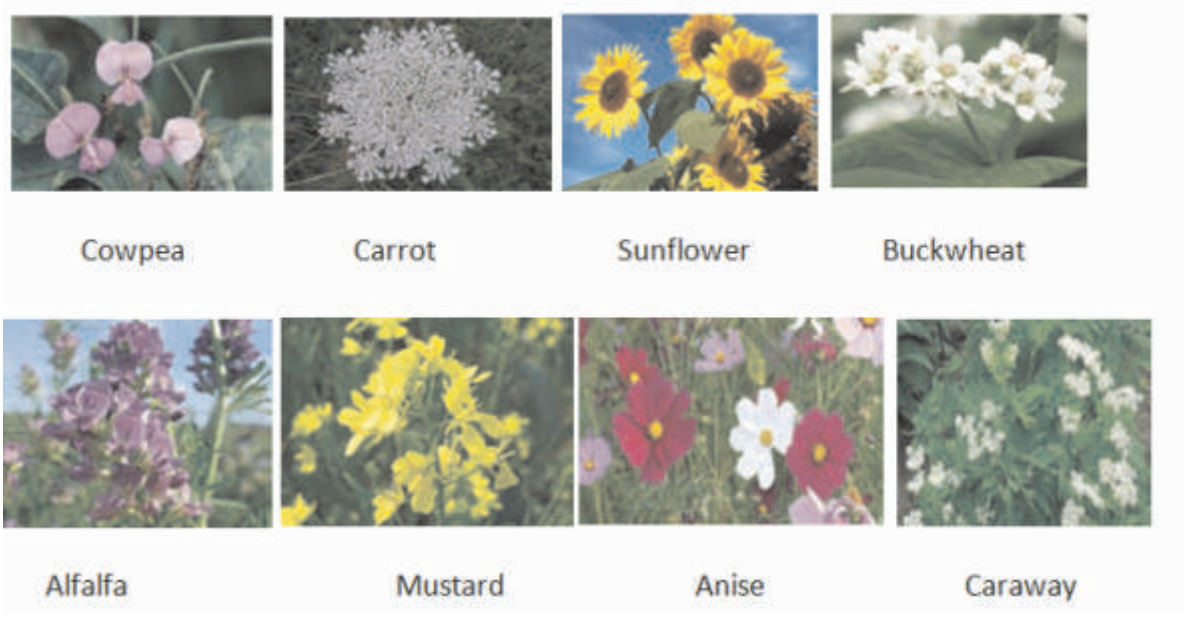
10) Mealybug-Moist and warm conditions are favourable.
Damage symptoms:

- Premature dropping of fruit.

11) Aphid-
Damage symptoms:

- Nymphs and adults suck the sap from leaves, shoots and fruits
- Yellowing of leaves
- Wilting of terminal shoots.

Plants Suitable for Pest Management-



COMPARISION OF DIFFERENT TECHNIQUES

Technique	Advantages	Disadvantages
K-nearest neighbor(KNN)	Simple implementation.	It is lazy learner. Computationallyexpensive.
Radial Basis Function	Trains faster,Hidden layer is easy to interpret	It is slower in Execution.
ProbabilisticNeural Networks	Tolerant of noisyInputs.	Long trainingtime.
Back propagationnetwork	Simpleimplementation	Slow andInefficient.
Support VectorMachine(SVM)	Less over fitting,Robust to noise.	Computationally expensive.
Dual-segmented regression analysis	a method for monitoring andearly detection of calcium deficiency in lettuce.	system can be used to monitor plantsin greenhouses during the night, but more research is needed for its use during the day, when lighting conditionsvary more intensely.
Thresholding	Aims to discriminate between maize plants affected by fall armyworm from healthy ones using digital images.	In the image analysis stage, the whole image is divided into 12 blocks. Blocks whose leaf area is less than 5% of the total area are discarded.

IV. CONCLUSION

In this review different image processing techniques for pest detection and plant disease detection are studied. The image processing technique proved as an effective machine vision system for agriculture domain. In this paper various feature extraction techniques and classification techniques are compared.

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