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Plant Leaf Disease Identificationand Prevention by Mobile Vision System.

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Abstract: *The agricultural plants need to monitor for control and management of plant disease yield plant harvesting. In this system we use mobile phones for real time monitoring of plant disease for proper diagnosis and treatment. A central server is placed at the pathological laboratory for sharing of the data collected by the mobile phones. The part of the processing carried out in the mobile device includes leaf image segmentation and spotting of disease patch using improved k-means clustering. The collected information is process at the central server and appropriate action is taken according to the test cases.*

Keywords-*mobile vision; m-Agriculture; plant disease diagnosis; unsupervised segmentation; power conservation.*

I. INTRODUCTION

The primary purpose of Energy Efficient Mobile Vision System for Plant Leaf Disease Identification is to provide a clear and descriptive "statement of user requirements" that can be used as a reference in further development of the software system. This document is broken into a number of sections used to logically separate the software requirements into easily referenced parts**.**

This report aims to describe the Functionality, External Interfaces, Attributes and Design Constraints (IEEE Std.830-1993) imposed on Implementation of the software system described throughout the rest of document. Throughout the description of the software system, the language and terminology used should unambiguous and consistent throughout the document. Now a days, world is like a global village due to computerization and internet facility. Here we are interested to introduce a new concept for advanced, well-educated and interested farmers who are adopting latest technologies in farming. We are providing the facilities like guidance regarding different plants, market updates of different commodities, different diseases and the treatments on different plants like fruits, and grains., Experts opinions on different diseases on crops and animals, maintaining dealers information of different cities.

II. LITERATURE SURVEY

A literature survey is studying several scholarly papers on the saidtopic, which includes the current knowledge including substantive findings, as well as theoretical and methodological contributions to a particular topic. Literature review is focused on a research questions, tryingto identify, appraise, select any synthesize all high quality research evidence and arguments relevant to that question

[1]H. Al-Hiary,S. BaniAhmad,M. Reyalat,M. Braik,Z. ALRahamneh in Energy Efficient Mobile Vision System for Plant Leaf Disease Identification. The paper discusses that it provides faster and more accurate solution.The experimental results demonstrate that the proposed technique is a robust technique for the detection of plant leaves diseases. The developed algorithms efficiency can successfully detect and classify the examineddiseases with a precision between 83% and 94%, and can achieve 20% speed.

[2]Anand.H,Kulkarni,AshwinPatil R. K.in Applying image processing technique to detect plant diseases.The paper discusses that developed good classification systemfor plant diseases. The Gabor filter is used for segmentation and Artificial neural network is used for classification of diseases. Artificial neural network based classifier is adopted which uses the combination of color and texture feature to recognize and classify different plant diseases. Experimental result showed that classification performance by ANN taking feature set is better with accuracy 91%.

[3]S. Arivazhagan,R. Newlin,Shebiah ,S. Ananthi, S. Vishnu Varthin in Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texturefeatures.The paper discusses that automatic detection of plant diseases is anessential research topic as it may prove benefits in monitoring large fieldsof crops, and thus

automatically detect the symptoms of diseases as soonas they appear on plant leaves.

[4]-Arti N. Rathod, Bhavesh, TanawalVatsalShah in Image Processing Techniques for Detection of Leaf Disease.Thepaper discusses that it indicates that the neural network classifier thatisbasedonstatistical classification support accurate and automatic detection of leafdiseases with a precision of around 93%.K-means clustering provides efficientresult in segmentation RGB image.

Existing system

In recent days, there has been an attempt to assist the farmer by telephonyservice but, this service is not 24X7 hours service. Sometimes, the farmersare not able to connectwith experts due to communication failures. Another important problem is that in a critical situation, if the farmers are not ableto explain or if the disease is a new one, then farmers would not be able toidentify the diseases of the crops. Captured images from crop surfaces canprovide a better solution where the remote agri-scientist can see instantly theimage fordisease diagnosis. Similarly, captured skin, face, or other imagesthrough the developed application may be sent to expert doctors to extendtelehealth advice to remote areas.

1. Manual Treatment.
2. Telephonic Suggestion
3. System Application for treatment based on symptoms.

III. PROPOSED SYSTEM

To develop a remote diagnosissystem for monitoring, control and managementof agriculturalproduction through use of advanced technology, especiallyimage processing and computer vision, information and communicationtechnology,and mobile technology.Mobile-based agriculture (m-Agriculture) refers to the delivery of agriculturerelatedservices via mobile communications technology. In order to informdecisions on agricultural measures to optimize plant growth, it provides forindividual decision-support systems and services which are based on localizedcontextual information, i.e. delivering location-specific informationbased on climatic patterns, soil and water conditions.It also involves gathering relevant data through mobile technologies likeautomated weather stations or systems Equipped with sensors for locationbasedcollection. Thus, m-Agriculture involves two-way advisory systemsthat provide individual feedback and advice such as remote diagnosis ofdiseases by experts. These systems typically include the use of smartphonesand intermediaries for the communication with farmers and require remotesensing instruments and GIS.

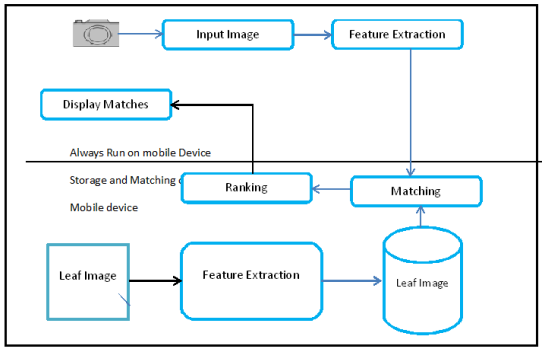

Figure 1: Proposed System

Proposed Methodology

A. Leaf image segmentation

In image, video and vision applications image segmentation is a fundamental step to separate homogeneous regions. For image analysis and image understanding, proper segmentation is a necessary condition. Features such as color histogram, texture or edge based methods are used for finding homogeneous regions in an image.Image segmentation methods are classified as supervised or unsupervised. In our work, we propose to use k-means clustering approach for color leaf image segmentation. An image is composed of foreground and background. In our work, we assume that the leaf image is available with simple and uniform background.

B. Selection of diseased patch

The image of the diseased leaf captured by the mobile device in the field needs to be transmitted to some central server present in the pathology laboratory. In White et al. captured and transmitted the complete image to a tablet PC located nearby. However, this requires a proper connection and a high speed Internet connectivity.

Mobile Application Development

The mobile application consists of 5 basic functionalities. They are

1) Training
2) Image Capture
3) Image Selection
4) Image Acquisition
5) Pre-processing

1. Training

In this module, necessary input is fed to the system in the form of images of the leaf. The

system applies necessary steps to extract values for vital parameters from the image. This image along with these parameters with their values and other essential information is stored in the database. These functions are performed by the admin from his login screen

2. Image capture

At the very first page of the application, the application bar shows the icon for capturing image using the application. On navigation of the menu, the user gets to take image on shutter click event using the phone.

Figure 2: Capturing leaf disease image using mobile

3. Image selection

In case of previously taken pictures of paddy, the application navigation menu also contains the option of selecting an image from the existing photo library of the phone.

4. Image Acquisition

This module is a part of the app installed on the android mobile. This module is initiated whenever the user intends to discover details about any leaf. Using this module, the user can submit the image of the leaf for its identification by thesystem. This module captures the image and sends it to the central server for processing.

5. Pre-processing

Using this module, the image captured from the user's mobile is subjected to necessary pre-processing. In this method, the image is converted into a standard binary format from other format like colour or gray scale. This pre-processed binary image is then subjected to identification wherein the vital parameters of the leaf are extracted for its comparison.

6. Identification

In this process, the vital parameters of the leaf are extracted for its comparison with the ones stored in the database. The algorithm is applied on the pre-processed image for its comparison. The image which has maximum of its characteristics matched with the ones stored in the database is displayed to the user for viewing further details about the leaf.

IV.ALGORITHM

A. Feature Extraction

In this process, the area of coin is taken as the reference. Adjust the distance between the camera and the leaf.

Algorithm:

Step 1: start
Step 2: acquire the leaf image
Step 3: convert colour image to gray scale
Step 4: convert gray scale to binary
Step 5: count number of pixels in the leaf vicinity
Step 6: multiply pixel count with one pixel value
Step 7: compare with database image
Step 8: stop

B. Edge Detection

Every leaf is having its own edge features. Some leaf boundaries are saw tooth, some are smooth and some are wavy so on. Also midrib alignment and vein pattern of leaves are different. Hence this algorithm is used to extract this information. Here Canny edge detection algorithm is used.

Algorithm:

Step 1: start
Step 2: acquire the leaf image
Step 3: convert colour image to gray scale
Step 4: apply Canny edge detection algorithm
Step 5: calculate histogram
Step 6: compare with edge histogram of the database image
Step 7: stop
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C. Colour Histogram

Every leaf is having its own colour with varying intensity. Some are green; some are yellow, red so on. Even though we consider green coloured leaf its intensity will be different. Hence this part of algorithm extracts this information from an input leaf.

Algorithm:

Step 1: start
Step 2: acquire the leaf image
Step 3: calculate the green histogram, blue histogram and redhistogram separately.
Step 4: calculate the difference with the database image
Step 5: stop.

Fig. 3 Leaf image

Edge detection of leaf mage

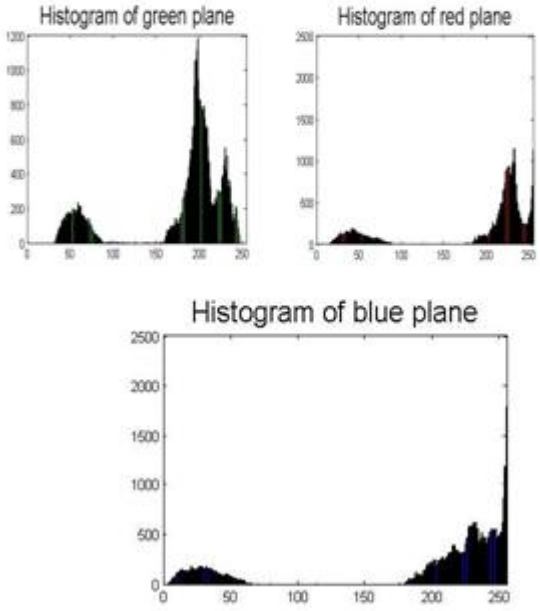

Fig 4: Green, Red and Blue Histograms of the leaf

V. EXPERIMENTAL RESULTS

The complete system is designed using OpenCV and Androidoperating system. The minimum hardware requirement
for mobile devices is 1 GHz processor and 256 MB RAM.
Here, though multi-core processors are available, the experiments
are carried out on single core processor to actuallymeasure the computational cost and time factor associatedwith it. A total of 297 diseased leaf samples are capturedusing different mobile devices at different resolutions. Thesegmentation results of few leaf samples are shown in Fig.5.Clearly, it is seen thatthe segmented leaf image requires less transmission cost totransfer over a wireless medium. The transmission link used in our experiments is a high speed wireless connection of 54Mbps.

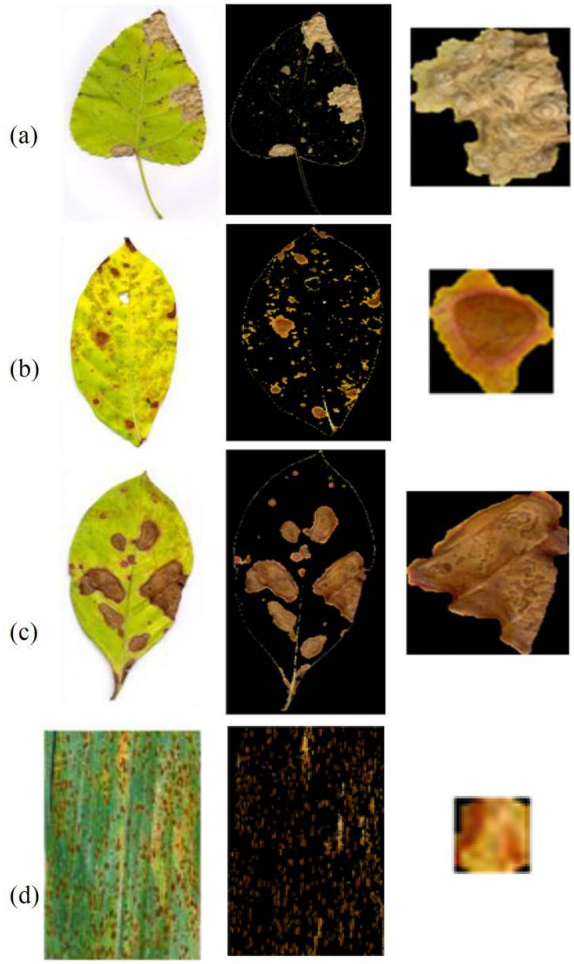

Fig. 5. Segmentation results of four different leaf images. The last (bottom) leaf image is a complex incomplete leaf image.

V.CONCLUSION

After reviewing above mentioned techniques and methods we can conclude that there are number of ways by which we can detect disease of plants. Each has some pros as well as limitations .On one hand visual analysis is least expensive and simple method, it is not as efficient and reliable as others Image processing is a technique most spoken of very high accuracy and least time are major advantages offered, but it backs away when implementing practically. Alongside the supply of cultivation tools, the farmers also need access to accurate information that they can use for efficient crop management and there is no better way than providing them a service that they can use through their mobile phones.Our undertaken project is thus going to be useful for farmers by providing an useful plant leaf identification system and will eventually identify their diseases.

VI. ACKNOWLEDGEMENT

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VII. REFERENCES

[1]Shitala Prasad Sateesh K. Peddoju D. Ghosh in "Energy Efficient Mobile Vision System for Plant Leaf Disease Identification",Wireless Communications and Networking Conference (WCNC), 2014 IEEE ,Istanbul,6-9 April 2014 ,pp.3314 - 3319

[2]Anand.H,Kulkarni,AshwinPatil R. K.in "Applying image processing technique to detect plant diseases." International Journal of Modern Engineering Research (IJMER)www.ijmer.com Vol.2, Issue.5, Sep Oct. 2012,pp.3661-3664

[3]S. Arivazhagan,R. Newlin,Shebiah ,S. Ananthi, S. Vishnu Varthin in "Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features."March, 2013 AgricEngInt: CIGR Journal,SivakasiTamilnadu.Vol. 15, No.1 211

[4]-Arti N. Rathod, Bhavesh, TanawalVatsal Shah in "Image Processing Techniques for Detection of Leaf Disease.",IJARCSSE Volume 3, dist.Anand, Gujarat,, Issue 11 ,November 2013

[5]S. Prasad, S.K. Peddoju, and D. Ghosh, "Mobile plant species classification: a low computational approach," Proc. IEEE 2 nd Intl. Conf. Image Information Processing, Shimla, India, 09–11 Dec. 2013.

[6]A. Camargo, and J. Smith, "Image pattern classification for the identification of disease causing agents in plants," Computers & Electronics in Agriculture, vol. 66, no. 2, pp. 121–125, 2009.