International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 04 | Apr 2019 www.irjet.net p-ISSN: 2395-0072

Disease Diagnosis of Mango Leaf

Prof. S.M. Malao[1], Pratiksha Gaikwad[2], Priyanka Palve[3], Rutuja Suryawanshi[4], Nirali Suthar[5]

[1,2,3,4,5]*Department of Computer Technology, SPPU*

Abstract - *Plant diseases are one of the most important reasons that lead to the destruction of plants and trees. Detection of those plant diseases at early stages enable us to overcome and treat them appropriately. For example, the diagnosis of plant diseases on mango plant which is considered as economic fruit everywhere. The climate changes of plant diseases affect the growth of mango trees. Many types of agriculture yield are decreased due to lack of knowledge on how to classify type of plant disease correctly. Related works on detecting diseases on plant diseases are also investigated and it was observed that existing systems have less efficiency. The agriculturist should have the application which works in process of specific plant disease diagnosis as expert human work. The plant disease diagnosis application applies a knowledge base system in form of rule-based model obtained by data mining technique. The objective is to provide computer-based support for agricultural specialists or farmers. The proposed system makes diagnosis on the basis of responses of the user made against queries related to particular disease symptoms.*

Key Words: **Expert System, diagnosis, knowledge base, plant disease, Data mining.**

1. INTRODUCTION

India is an agricultural country where in most of the population depends on agriculture. The early stage of disease diagnosis is an important task. Farmers require continuous monitoring of experts and it might be expensive and time consuming. Therefore looking for fast, less expensive and accurate method to automatically detect the diseases from the symptoms that appear on the plant leaf is of great realistic significance. This enables machine vision to provide image based automatic detection. The objective of this project is to detect plant leaf disease detection. It is being great difficulty for farmer to change from one disease control policy to another. Depending upon only pure naked-eye observation to detect and classify diseases can be expensive. Various plant diseases pose a great threat to the agricultural sector by reducing the life of the plants. Plant diseases have put us into a dilemma as it can cause significant reduction in both quality and quantity of agricultural products. Automatic detection of plant diseases is an essential research topic as it may prove benefits in monitoring large fields of crops the present work is aimed to develop a simple disease detection system. The proposed system is a complete software solution for automatic detection and classification of the plant leaf diseases and their medication process based on environmental condition. This research work focuses on conditionally look over a complete software based method for evaluating plant diseases based on image processing techniques.

Analysis of the plant characteristics or the unusual appearance of plant leaves referred the observable disorder in plant leaves. Presently crops or we can say plants showing very unusual characteristics. Therefore, detection of such diseases is very necessary at the early stages. But in today's faster life it is too difficult to stick many notices on notice-board. So the organizations, industries, malls are now-a-days using the digital notice board also, in trains and buses the important information like platform number, information of ticketed is displayed in digital notice boards. People are now adapted to the idea of the world at its finger-tips in previous day due to extensive cabling there were too many limitations.

2. RELATED WORK

Windows Phone application which is able to recognize vineyard diseases from the picture of the leaves with accurateness elevated than 90 percentage. This function can simply apply to dissimilar plant diseases as well as smart phone platforms. But only small training set is used for the image detection and also has the limitation of an application platform. A real-time testing system is where the results are obtained from cotton and groundnut plantations. The accuracy levels for disease identification for groundnut and cotton plantations are found to be satisfactory. To achieve better detection accuracy with different plant species we have to use efficient methodology. Identification of plant disease through the leaf texture analysis and pattern recognition system can be further improved by improving the training ratio with sshape and vein, color, and texture features to classify a leaf. In this case, Probabilistic Neural network (PNN) was used as a classifier. This gives the tentative result that shows the technique for categorization presents an average precision of 93. 75 percentage when it was experienced on Flavia dataset, which includes 32 kinds of leaves. Fungus/ailment Analysis in Tomato Crop with the help of Image Processing Technique. In this paper, the photo of the crop leaf is taken with the help of camera and process for obtaining a gray colored and segmented image based on the character and the size of the fungus. A reference is fixed for suitable acceptance and refuse crop quality depending on the growth of fungus level.

Rule-based model with leaf image dataset. Experimental results performed that the rule-based model with 129 leaf

images which collected from mango field area under supervision of product quality and standardization, Maejo University and 3 answers

of class label (Anthracnose, Algal Spot, normal) have 89.92 percentage of accuracy. From the experimental result indicated that the rules-based model can be applied to the plant diagnosis application. This article had the objective of organizing all the information that has been published on the subject in the last four decades by presenting a brief individual description of each proposed system, and then condensing all the information into a critical analysis of how the problem was handled in the past, how it evolved into the current scenario, and which are the possible directions to be explored in the future. Innovative approach to automatically detect and grade the diseases on pomegranate fruit module identification of the paper is Bacterial Blight, Fruit Rot, Alternaria fruit spot, Cercospora fruit Spot diseases on pomegranate fruit. Molecular techniques and profiling of plant volatile organic compounds were used for diseases detection its vital functions such as photosynthesis, fertilization, transpiration, pollination, germination and some pomegranate fruit disease:

Cercospora (Cercospora sp): The affected fruits showed small random black spots, which later on coalesce into big spots.Bacterial Blight (Colletotrichum gloesporioidesl): The disease was characterized by appearance of small, random and water-soaked spots on fruit. If cracks are passing through the spots then the disease identified would be Bacterial blight. Fruit Rot (Aspergillums foetidus): The symptoms were in the form of round black spots on the fruit and petiole. The disease starts from calyx end and gradually the entire fruit shows black spots, the fruit further rots emitting a foul odor. Alternaria Fruit Spot (Alternaria alternata): Small reddish brown circular spots appeared on the fruits, as the disease advances these spots, blend to form larger patches and the fruits start crumbling, the arils get affected which become and become not suited for consumption. Spectroscopic and imaging based, and volatile profiling-based plant disease detection methods, Segmentation of leaf image is important while extracting the feature from that image, Methods of this spectroscopic and imaging techniques are: fluorescence imaging, multispectral or hyper spectral imaging, and infrared spectroscopy.

The fluorescence steady at certain frequencies such as 450nm, 550nm, 690nm, and 740 nm and provide difference between the fluorescence at 550 nm and 690nm were higher in the diseased portion of the leaves. While it was very low for healthy regions on the leaves. Quadratic discriminant analysis (QDA) used for analysis, QDA classified healthy and diseased plants with an accuracy of 71% and 96%, respectively.

3. SYSTEM ACHITECTURE

3.1.1 Types of Disease

There are varieties of disease spots which tend to resemble each other and can easily be confused with one another by inexperienced people. Misunderstanding one spot for another can be quite catastrophic as application of the wrong fungicide will result in loss of money without the plant being treated and allowing more time for the disease to spread further.

_ **Red Rot:** The disease first appears as red bright lesions on mid rib of leaves and shows itself as drooping and changing of color of upper leaves. Withering of the leaves proceed downwards. Usually third or the fourth leaf from the top is affected and shows drying at the tip. The pith becomes red and later on brown.

_ **Leaf Spot:** The disease may be characterized itself on leaves as small lesions, which gradually enlarge along mid rib and assure dark red to brown color. In severe infection, the leaves become dry affecting photosynthesis.

_ **Brown Spot:** Brown spot causes reddish-brown to dark-brown spots on sugarcane leaves. The spots are oval in shape, often surrounded by a yellow halo and are equally visible on both sides of the leaf. The long axis of the spot is usually parallel to the midrib. This spot often tends to be confused with the Ring Spot.

_ **Sugarcane Mosaic Virus**: Mottling of young crown leaves showing a definite pattern of alternating dark and light green colored patches of varying size and run parallel to the midrib of leaf.

_ **Yellow Spot:** There exist two types of Yellow Spot. The first is yellow in color. However, in certain varieties of sugarcane with red stalks, the spots appear as detection is general term of this paper and color space, color, histogram, grey level co-occurrence matrix (CCM), Gabor filter, Canny and Sobel edge detector are feature extraction techniques of this paper. Mobile application is a software platform where the user can actually enter the data. Despite the color, both types have the same physical characteristics. They are irregular in shape and dimension. They can vary from minute dots to spots attaining 1 cm in diameter.

3.1.2 Proposed Methodology

The general system for detection and recognition of disease in plant leaf consists of three main components:

_ Image analyzer
_ Feature extraction
_ Classifier

Figure 3.1: System Architecture

The processing that is done by using these components is divided into two phases. The first phase is the offline phase or Training Phase. In this phase, a set of input images of leaves (diseased and normal) were processed by the image analyzer and certain features were extracted. These features were given as input to the classifier, and along with it, the information whether the image is that of a diseased or a normal leaf. The classifier learns the relation among the features extracted and the possible conclusion about the presence of the disease. Thus the system is trained. The second phase is the online phase, in which the features of a specified image is extracted by image analyzer. Then it is tested by the classifier whether the leaf is diseased or not, according to the information provided to it in the learning phase (offline phase).

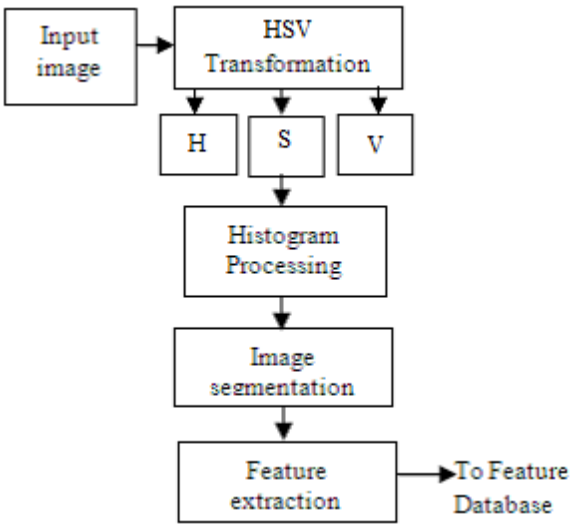

Figure 3.2: Image analyzer

3.1.3 The step-by-step procedure of the proposed system

_ RGB image acquisition

_ Convert the input image from RGB to HSV format.

_ Masking of green-pixels

_ Removal of masked green pixels

_ Segment the components

_ Obtain the useful segments

_Computing the features using

color-co-occurrence methodology

_ Evaluation of texture statistics

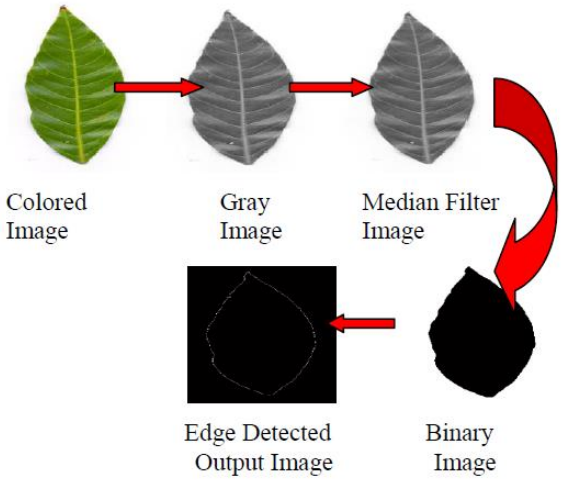

Figure 3.3: Work Flow

1. **Color Transformation Structure:** The RGB images of leaves are acquired first. Then RGB images are converted into Hue Saturation Value (HSV) color space representation. RGB is an ideal way for color generation. HSV model is an ideal tool for color perception. Hue is a color attribute that describes pure color as perceived by an observer. Saturation refers to the relative purity or the amount of white light added to hue and Value means amplitude of light. After this transformation process, the Hue component is taken for further analysis. Saturation and Value are dropped as it does not give an extra information.

2. Masking and removing green pixels: Masking means setting the pixel value in an image to zero or some other background value. In this step, we identify the mostly green colored pixels. After that, based on specified threshold value is computed for these pixels. The green components of the pixel intensities are set to zero if it is less than the pre-computed threshold value. Then red, green and blue components of the pixel are assigned to the value of zero by mapping of RGB components. The green colored represent the healthy areas of the leaf and they do not add any valuable weight to the disease identification.

3. Segmentation: From the above steps, the infected region of the leaf is extracted. The infected region is then segmented into a number of patches of equal size. In this approach patch size of 32X32 is taken.

4. Obtaining Useful Segments: In this step, the useful segments are obtained. The size of the patch is chosen in such a way that the significant information is not lost. Not all segments contain significant amount of information. So the patches which are having more than 50 percent of the information are taken into account for further analysis.

5. Color co-occurrence Method: In statistical texture analysis, texture features are computed from the statistical distribution of observed combinations of intensities at specified positions relative to each other in the image. Spatial Gray-level Dependence Matrices (SGDM) method is a way of extracting statistical texture features. A GLCM is a matrix where the number of rows and columns is equal to the number of gray levels G, in the image.

3.3 CLASS DIAGRAM

In software engineering, a class diagram in the Unified Modeling Language (UML)is a type of static structure diagram that describes the structure of a system by showing the system classes, their attributes, operations and the relationships among the classes. It explains which class contains information.

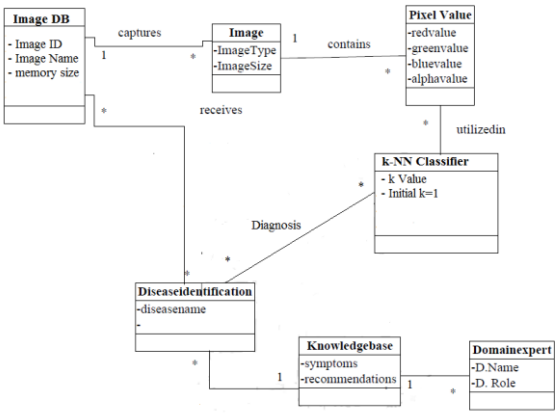

Figure 3.4: E- R Diagram

4. APPLICATIONS

1. Botanical gardens to maintain the plant health

2. Greenhouses, to prevent the out spread of diseases among sensitive plants

3. Nurseries where medicinal herbs are cultivated

5. CONCLUSION

Proposed System shows usefulness of integration of an image analyzer aided with pattern recognition within a diagnostic expert system model. In order to diagnose a disorder from leaf image, four image processing phases have to be applied: Image enhancement, Image segmentation, Feature extraction, and classification. In order to employ proposed system we first have to train it with a set of images of disorders. Applying this model to any other crop disorder requires only spatial care to be taken in order to acquire a sufficient set of images for training purpose as representative of these disorders. Integration of this proposed system diagnosis will increase the accuracy. Proposed system focuses on specific disorders identification and can be extended in order to include more disorders. Extension of system will be capable to detect and identify abnormalities on the other parts of plants also e.g. fruit, stem, and root. Potential future work will be development of a robotic expert system which may capable to see abnormalities of plant, understand it and do treatment operations directly. Other important future work will be integration of diagnosis prior to disease in the proposed system with the help of extensive plant characteristics and its behavioral study.

REFERENCES

[1] Nikos Petrellis, A Smart Phone Image Processing Application for Plant Disease Diagnosis 2017 6th International Conference on Modern Circuits and Systems Technologies (MOST).

[2] Sai Kirthi Pilli1, Bharathiraja Nallathambi, Smith Jessy George, Vivek Diwanji, eAGROBOT- A Robot for Early Crop Disease Detection using Image Processing, IEEE Sponsored 2nd International Conference On Electronics And Communication System (ICECS 2015).

[3] Harshal Waghmare, Radha Kokare, Detection and Classification of Diseases of Grape Plant Using Opposite Colour Local Binary Pattern Feature and Machine Learning for Automated Decision Support System, 3rd International Conference on Signal Processing and Integrated Network 2016.

[4] Abdul Kadir , Lukito Edi Nugroho , Adhi Susanto, Paulus Insap Santosa, Leaf Classification Using Shape, Color , and Texture Features, SACMAT12, June 2022, 2012, Newark, New Jersey, USA. Copyright 2012 ACM 978-1-4503-1295-0/12/06.

[5] Meunkaewjinda. A, P.Kumsawat, K.Attakitmongcol and A.Sirikaew, Grape leaf disease from color imaginary using Hybrid intelligent system, Proceedings of the IEEE S&P, pages 95109. IEEE, 2012.

[6] Chutinan Trongtorkid, Part Pramokchon., "Expert System for Diagnosis Mango Diseases Using Leaf Symptoms Analysis". The 3rd International Conference on Digital Arts, Media and Technology

(ICDAMT2018).