DISEASE DETECTION IN PLANTS
Dept. of Computer science and engineering Royal College of engineering and technology, Akkikavu Calicut University

ABSTRACT:
Agriculture is demographically the broadest economic sector in India and plays a significant role in the overall socio economic fabric of India. Several diseases affect plants and cause economic, social and economic losses. So detection of diseases accurately and giving control measures timely will increase growth of agriculture in India. The proposed system identifies the disease by observable patterns of particular plant; here SVM used for classification. This is an efficient and accurate method for automatic disease detection in plants.

Keywords: Image processing, k-means clustering, median filtering, PCA, SVM

[1] INTRODUCTION
The purpose of agriculture is to not only feed ever-growing population but it is an important source of energy and a solution to solve the problem of global warming. Plant diseases are extremely significant, as that can adversely affect both quality and quantity of crops in agricultural production.

A plant disease is a condition caused by infectious organisms or environmental factor. This condition is being studied in a scientific field called the Plant Pathology. The plants that can cause this disease include fungi, bacteria and virus. Generally, the naked eye method is used to identify the diseases. But this method involves lots of efforts, time consuming and also not practical for the large fields. There are many failure cases in this observation technique. So the farmers cannot apply the control measures successfully.

In this paper, the proposed work is to automatically detect the plant diseases from the symptoms that appears on the plant leaves. Here features of each object is extracted with the help of image processing. The system will also provide the output with brief explanation of control measures of the specified disease. Everybody shall understand the things easily so the proposed system shall ensure maximum efficiency at minimum cost in the field agriculture.

[2] RELATED WORKS
Prof.Atul Shire, Prof.Umesh Jawarkar, Mr.Manoj Manmode [1],proposes “A Review Paper On: Agricultural Plant Leaf Disease Detection Image Processing”. In this paper, they described several analytical methods to classify the images according to the specific problem. Image clipping, smoothing and enhancement are three steps included in pre-processing. K-Medoid Algorithm is used for image segmentation. Co-occurrence methodology is used for
feature extraction. For automatic detection of leaf disease, the neural network is used. For clustering and classification of disease the application of medium filter, CIELAB colour model, and clustering and texture analysis are formulated.

Bed Prakash, Amit Yerpude [2], proposes “A survey on plant leaf disease identification”. It provides survey on the leaf disease detection technique where leaf spot disease is identified based on different morphological features. Different identification techniques used are Manual, Genetic Algorithm, Back propagation neural network, principal component analysis, and probabilistic neural network. Genetic algorithm are mainly used for feature classification and feature selection and its basic purpose is optimization. Back propagation neural network is to determine the behaviour of the network. Principal component analysis tries to describe the important variability of data in a reduced number of dimensions. Probabilistic neural network can be used for classification problems it has a natural tendency for storing experimental knowledge. The various image processing and neural network approaches can be applied for the identification of the leaf disease on plants are image acquisition, image pre-processing, image segmentation, feature extraction, classification.

Smita Naikwadi, Niket Amoda [3], proposes “Advances in image processing for detection of plant diseases”. In this paper disease is detected by using histogram and it is based on the colour feature and the edge detection technique. Plants disease is divided in to three phases for segmentation and clustering. They are K-means clustering technique, masking the green pixels on the boundaries, Feature extraction. And they use Co-Occurrence methodology for texture analysis.

Ms.Kiran R.Gabhale, Prof.Ujwalla Gawande, Mr.Kamal O.Hajari [4], proposes “Unhealthy Region of Citrus Leaf Detection Using Image Processing Techniques”. This Paper explains the number of image processing techniques used in performing early detection of plant disease through leaf inspection. SF-CES provides better enhancement of colour images, Lab and Ycba colour space support K-means clustering for disease part extraction through the means of clusters. Then GLCM (Gary Level Co-Occurrence Matrix) texture feature and colour texture are extracted for further classification purpose. Finally classification is done based on Support Vector Machine (SVM). With this method, the use of harmful chemicals on plants can be reduced and hence ensure a healthier environment.

M.P.Raj, P.R,Swaminarayan, J.R.Saini, D.K.Parmar [5], proposes “Application of pattern recognition algorithm in agriculture: A review”. It explores employment of pattern recognition in an agricultural domain. The design module of Pattern Recognition system essentially involves three steps they are Pre-processing, Feature Extraction and Feature Selection. Pre-processing is mainly for removing noise from the data. Feature extraction and Feature selection are capable of improving learning performance, lowering computational complexity, building better generalized models and decrease required storage.

[3] PROPOSED METHODOLOGY

A. Image Acquisition
Initially, the digital images are acquired from the circumstances using a digital mobile camera or digital camera and given as input to the identification system. This is the image in which the leaf disease has to be identified by the system.

![Working diagram](image)

**Figure: 1. Working diagram.**

**B. Image Preprocessing**

From the location referring different sites, the digital image is acquired. Regardless of what image acquisition device are adopted, the image which have input always not satisfactory. If noises are present in image the region of curiosity in the image is not clear and other objects interference exists. In the image cropping, enhancement and thresholding are the three steps included in preprocessing phase. The process of image collection and lots of information may bring noise which may easily lead from operating and saving to the image would make the quality of image dropped, thereby affects following of diseases. To perform denoising different kinds of reduction technique are applicable. By choosing the appropriate threshold, medium filter performs better with the salt and pepper noise. The image will have dark pixel in bright region and will have bright pixel in dark region, and green regions. Medium filter is a nonlinear filter which is an effective method to remove the noise. It simply placed each pixel value with medium of the intensity level in the neighborhood of pixel.

**C. Image Segmentation**

Image segmentation is the methodology of apportioning a digital image into different fragments (sets of pixels, otherwise called super pixels). The objective of segmentation is to improve and/or change the representation of an image into something that is more significant and less demanding to examine. The consequence of image segmentation is a situated of sections that aggregate cover the whole image, or a set of forms removed from the image (see edge detection). Each of the pixels in a locale are comparative as for some trademark or registered property, for example, shading, force, or surface. Nearby districts are essentially diverse as for the same characteristic(s). C. Image segmentation is process used to simplify Representation of an image into something that is more meaningful object of interest.
from background and easier to analyse. Segmentation is also done through feature based clustering. Many methods can be used for this. Salt and pepper, image clustering, K means algorithm is some of examples.

D. Feature Extraction

After segmentation the area of interest i.e. diseased part extracted. The aim of this phase is to find and extract features that can be used to determine the meaning of a given sample. Image features usually include color, shape and texture features in image processing. Texture is one of most popular features for image classification and retrieval. Currently most of the researchers targeting plant leaf texture as the most important feature in classifying plants. In this there is several methods are existing.

E. Principle Component Analysis

PCA is a statistical procedure that uses orthogonal transformation to convert a set of observations of possibly correlated variables into a set of values of linearly uncorrelated variables called principal components. The number of original variables is greater than or equal to the number of principal components. It is sensitive to the relative scaling of the original variables. PCA is the simplest of the true eigenvector-based multivariate analyses; PCA is closely related to factor analysis.

F. Classification

The details extracted from the images are classified and the description about the disease is entered into the storage for the later processing. Before going to the classification, we must know the concept of object recognition. The overall procedure of a classification is totally depending on an object recognition technique. There is a little difference between in image processing and object recognition and image processing deals with different technique, which can improve the visual quality of the input image, whereas object recognition deals with the description and classification of object.

In Decision theoretic approach, the pattern is represented in a vector space so the decision algorithm, which is based on a statistical concept, is used to decide which class the pattern belongs to. This method can broadly divide into classical and neural network approach. In this the classical approach depends on the statistics of the input data to be classified. Another one that is neural network is information-processing system that has some performance characteristics.

G. Plant & Disease Detection

The trained images are already stored in the database with their corresponding value. The matching is done between the captured image and stored image based on the value generated by SVM. If the value of both are same then the corresponding disease is detected. And also provide the corresponding control measures and disease description.
[4] RESULT AND DISCUSSION

The system proposed here is for plant leaf disease detection using image processing. The development of efficient classification methods and precise features is needed to run the system in real time. The classification method here used is SVM (Support Vector Machine) algorithm. Median filtering is used for image preprocessing, Gaussian filtering and salt and pepper algorithms are another alternative. Image segmentation is done by using K-Means clustering and Principal Component Analysis (PCA) is for feature extraction. For classification and detection Probability Neural Network (PNN) can be used. Normal system doesn’t meet the requirements to execute the PNN because it need a high performance computing environment. So in the proposed system very simple and efficient method called SVM (Support Vector Machine) is used.

[5] CONCLUSION

In this paper, the proposed system is to automatically detect the leaf disease and also provides corresponding control measures. The observation by an individual is the main approach adopted in practice for detection and identification of plant diseases. But there are many failure cases in this observation technique. The proposed system detects the disease using image processing technique and accurately provides the proper solution for this detected disease. It is very useful for farmers. Hence it ensures maximum efficiency at minimum cost in the field of agriculture. The development of efficient classification methods and precise features is needed to run the system in real time.
[6] FUTURE SCOPE

The proposed system can be used to predict the direction in which the disease spread. This can apply into large agricultural industry and using drones we can update daily information about the fields.

REFERENCES


