IDENTIFICATION OF DEFECTED AREA OF PLANT LEAVES

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Abstract
To detect the disease in plant leaves with the naked eyes is a very difficult process. The leaf images had been pre-processed and segmented using different techniques. Three algorithms are used to extract the defected area of the leaf: k-mean clustering, adaptive k-mean clustering, and proposed hybrid clustering. Hybrid clustering gave better results as compared to both techniques. For disease classification, Naive Byes and a tree classifier have been used. The tree classifier gave more accuracy as compared to the Naïve Byes classifier.
Keywords: adaptive, clustering, hybrid, k-mean, naive Bayes, tree classifier, Segmentation.

I. INTRODUCTION

Agriculture plays a vital role in India because more than 70% population dependent upon it [1]. Plant diseases are affected directly and indirectly to health as well as economically to both developer and consumer in the country due to the dependency upon agriculture. It is must detect the disease in the early stages to avoid the loss in terms of quality and finance. There are two types of plant diseases: i) Biotic diseases: Any living component that affects the other organism, plants and Environment is called biotic factor of disease or biotic stress.These are direct attacks on the plants and crops and increases due to water, air, etc. ii) Abiotic diseases: These are non- living factor that affects the other organism plants and all environments is called Abiotic factor.

II.Literature Review:

Siravenha and Carvahlo (2015) [1] developed a methodology for identification and classification of plant disease based upon the shapes of leaves that explore the discriminating power of the counter centroid distance in the flourier frequency domain. The influence of the feature selection technique regarding classification, accuracy also investigated. The principal component space and feed forward neural network combining with the set feature vector and 97.45% accuracy archived.**Chaki and Parekh (2011) [2]** described the identification of plant species based upon the morphological features of leaves. Computes well documented metrics such as the angle code histogram (ACH), then classifies the species based on a novel combination of the computed metric.**Gavhale and Gawande (2014) [3]** presented the analysis and classification techniques for extraction and classification of leaf diseases. SF-CES (color enhancement using scaling), used for image enhancement and K-mean clustering used for image segmentation. SVM (support vector machine) is used as a classifier and GLCM used for feature extraction. **Ghaiwat and Arora (2014) [6]** described about various leaf disease classification techniques based on its different morphological features like k-nearest neighbor, probabilistic neural network, genetic algorithm, support vector machine which is used for classifying the high dimensional data set and Principal Component Analysis, artificial neural network, fuzzy logic etc. **Varsha et al. (2013) [7]** described the methodology to detect the disease in the plant leaf using the steps image acquisition, pre-processing of input image segmentation.

III.Methodology

Proposed method

The following flowchart has been described the process to detect the defected area from the plant leaves.

A. Input image

Image captured through the camera and stored in a computer. The stored image had been given as input to the system for the further processing.

B. Image pre-processing

To remove noise from the image, cropping the image, resizing the image, pre-processing has been applied. The pre-processing increases the accuracy. The given input image has been converted into L*a*b color space. Fig 1 represented the steps in the process of the image segmentation of leaf images. The steps that have been carried out in the plant disease detection process. In this process leaf image has been taken as input image and apply preprocessing by converting the image into different regions that decomposes the image into three different sub-bands of red, green and blue region.

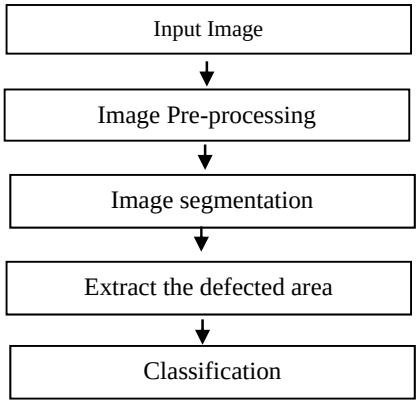


Fig1: Flowchart of the proposed work

C. Image segmentation:

For segmentation the k-mean, Adaptive and hybrid clustering techniques has been applied.

- **K-means clustering:** The K-means clustering has been used for classification of an object based on a set of features into a K number of classes. The classification of objects is done by minimizing the sum of the squares of the distance between the object and the corresponding cluster. The algorithm for K –means clustering is below.
- **Adaptive k- means clustering:** An Adaptive clustering has been used the Q-learning to learn the reward value of successive data clustering. Adaptive clustering support to reuse the clustering by memorizing what work well in the past. This algorithm has the capability of exploring multiple paths in parallel when searching for a good cluster. Adaptive clustering improves quality of the cluster using the external feedback.
- **Hybrid clustering:** Hybrid techniques used for detecting the defected area of plant leaves. It is a hybridization of techniques such as combining the k –mean clustering and adaptive k-mean clustering. It is the process of clustering is partitioning of a group of data points into a small number of clusters. The K –mean clustering has been used to partition n observations into k cluster in which each cluster with the nearest mean, serving as a prototype of a cluster and Adapt

D. Classification

The disease can be classified using the naïve byes and tree classifier. After processing of segmentation various parameters had been analyzed for performance evaluation of purposed system. These parameters are entropy, mean value, standard deviation and variance.

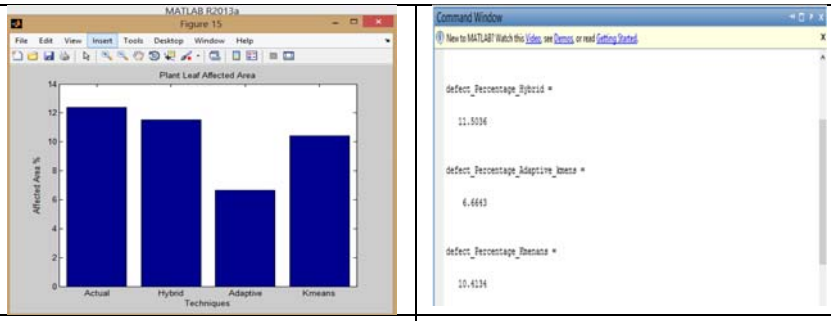
IV.RESULT

Various leaf images have been used for diagnosis the disease. Three techniques used to extract the affected area of plant leaves. The disease classified using mean, mode, standard deviation and entropy. In the segmentation the hybrid clustering, give, the better result as compare to k-mean and adaptive k-mean clustering.

(a) Input Images | *(b) Detected defected area*

Fig 2: Input images and detected defected area

Fig2 represents the input plant leave images used for disease diagnosis purpose. The hidden information and the defected areas of the plant leaf has been extracted using a hybrid technique which is a combination of two existing techniques namely k-means clustering and adaptive k means. Fig 3 (a & b) shows the comparison of various techniques for measurement of the affected leaf area. It has been found that the hybrid clustering techniques has extracted affected area close to the actual affected area as compared to other two techniques, namely k-mean clustering and Adaptive K- mean clustering



(a) Graph of comparson | *(b) Values of comparison*

Fig 3: Comparison of proposed and existing techniques

Table 1 also lists the comparison results of the proposed and existing techniques

Input Image	Actual defected area	Proposed Technique (Hybrid)	Adaptive K-mean clustering	K-mean Clustering
	9.9789%	8.5812 %	5.7526%	8.5194%
	9.9897%	8.7276%	5.8231%	8.3500%
	4.9897%	4.8149 %	4.1134 %	3.9505%

Table 1: Comparison of defected area of various techniques with actual defected area

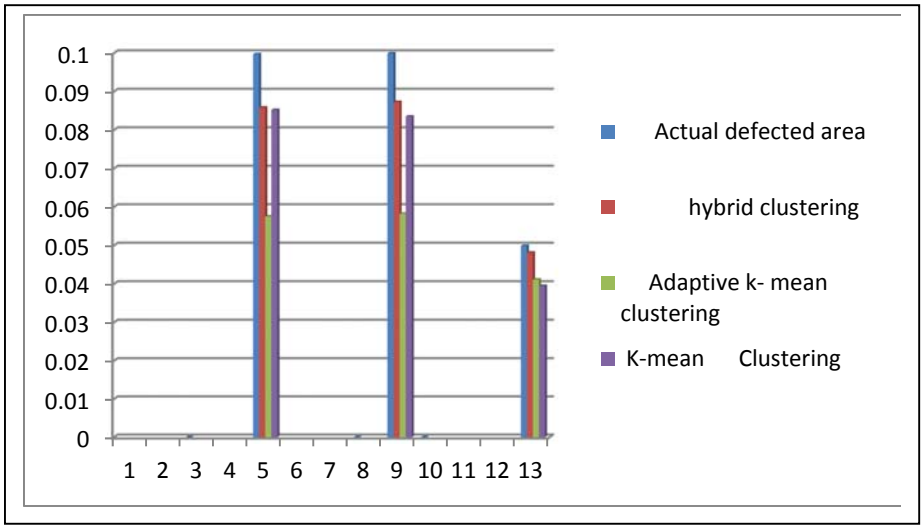


Fig 4: Graph of comparison of various techniques for percentage leaf defected area

II. CONCLUSION

Leaf disease diagnose is the used for extraction of features from the images. In this paper, the leaf image segmentation has been done to extract the disease in the leaf that can't visualize by naked eyes. In this paper, the naïve bayes approach has been used for extraction of diseases from the leaf images. By analyzing performance evaluation parameters, it has been concluded that the proposed hybrid approach provide much better extraction of plant leaf disease detection area as compared to previous approaches.

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