VARIOUS PLANT DISEASES DETECTION USING IMAGE PROCESSING METHODS

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***Abstract*: Identification of plant leaf diseases is the preventive measure for the loss happened in the yield and the overall agriculture crop quantity. Basically, the studies of the plant diseases are defined by visualizing and observing patterns observed and engraved on the leaves. So, the disease detection of any plant prior to any hazardous impact becomes very crucial factor for viable agriculture. However, it is so difficult to detect, monitor and derive conclusions from the plant leaf diseases manually because, the costs emerging in the process demands huge amount of workdone, energy, expertize and last but not least the processing time. Therefore, image processing concepts comes handy and are used for disease detections.The detection process includes the phases such as, image acquisition, segmentation, image pre-processing, feature extraction from segments and then classification based on the results. This paper discusses the elementary methods that are being used for the plant disease detection based on the leaf images.**

***Keywords*: Image acquisition, feature extraction, leaf disease detection, image processing,segmentation, classification**

INTRODUCTION:

India is a democratic country hugely dependent on cultivationand about 75% of the populacerelies on agriculture. Farmers nowadays got large number of diverse crop options and their related suitable pesticides which, controls the plant diseases and yield more. However, any disease of plant may leads to reduced quantity and quality of the particular crop. In most of the cases, the studies of such diseases regarded as observationsof patterns on the plant leaves manually. Monitoring of disease and health of a particular plant plays a symbolic part in better planting of crops in the farm. Earlier, the initial monitoring, analysis, conclusions were done manually by an expert person. Which, in turn required a huge amount of time, efforts, and processing time for the results. The digital image processing approaches that can be further applied for the process of disease detection. There are mainly limited portions of plant from where disease symptoms can be seen such as, on the leaves, on the branches and leading stem and also the fruit and flowers. The plant leaves are targeted first by any disease and the detection starts always from them, which signifies various symptoms of disease. In this paper we are providing the introductory information to image processing techniques that may be used for detection of various plant diseases.

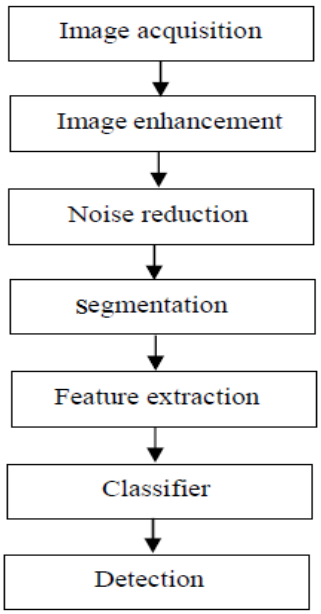
LITERATURE SURVEY:

The following authors and their papers are taken into account in the development of this research paper.

1. Wen jiang Huang et al. shown the new way of spectral indices for characteristic the winter wheat illness. He and his team contemplate three completely different pests that are (Powdery mildew, aphids and yellow rust) which is most common in winter wheat for study. The foremost and also the least significant wavelengths for different diseases were recorded and extracted victimization using RELIEF-F. The accuracies in the classification of those new samples for infected leaves with mildew, yellow rust were 80%. An enhanced picture has high quality and vivid features than the original low res image. The color pictures have primary components RGB i.e. red, green and blue. Consequently, team of wen jiang converted the RGB pictures into dark pictures. At that point, the histogram balance which circulates the powers of the pictures is connected to the picture to improve the plant sickness pictures.
2. Monica Jhuria et al. utilize picture handling for identification of ailment and the natural product reviewing. They have utilized the fake neural system for discovery of ailment. They have made two separate databases, one for the preparation of as of now put away malady pictures and second one for execution of the question pictures. The black spread is utilized for the size and weight modification of preparing database components. The backend think about three components, to be specific, shading, surfaces and morphology and discovered the morphological component that gives a preferable outcome in contrast to the counterparts.
3. Zulkifli Bin Husain et al. caught the stew leaf picture and prepared it to decide the wellbeing of the bean stew plant. Their procedure is guaranteeing that the synthetic concoctions ought to apply to the ailing bean stew plant as it were. Their team used MATLAB software for the component extractions and picture acknowledgement and then finished the pre-preparing. Followed by the process of utilizing the bits shifted and boundary edges recognition. Then after the expansion of the picture handling worldview for particle characterization. Here the advanced high-tech device is utilized image acquisitions.

PRELIMINARY STEPS FOR DISEASE DETECTION:

Below are the steps for the plant's disease detection displayed in the image.



1. Image Acquisition

The pictures of the leaves are caught using the high definition camera having RGB components not the gray scale. Shading change segments of the leaf picture are distinguished, and after that, forwarded to a device capable of autonomous shading change.

2. Image Pre-processing

To expel commotion in a picture or elective article expulsion, entirely unexpected pre-preparing procedures are considered. Picture cutting, for instance, editing of the leaf picture to instigate the intrigued picture locale. Picture smoothing is done through the smoothing channel. Picture improving is managed for expanding the qualification. The RGB pictures into the dark pictures abuse shading change utilizing condition i.e.

$f(x)=0.299*R + 0.58*G + 0.114*B$

At that point, the visual diagram accomplishment that appropriates the powers of the photos is connected to the picture to support the sickness pictures. The added substance appropriation perform is utilized to disperse power esteems.

3. Image Segmentation

The third phase is segmentation, means that image partitioning into numerous portions and segments of similar intensities and similarities. The process of segmentation is often done in many ways using algorithms for instance Otsu methodology, HIS model, k-means algorithm, etc.

- The segmentation mistreatment boundary edge detection: The image from the acquisition phase is taken into account and forwarded to the HIS model. The program for edge and spot detection runs the main program and detects the infected diseased part of the plant.

• K-means algorithm for clustering: This K-means algorithm is employed for clustering and classification of objects supported by a group of options into K variety of categories. The grouping of objects is done by minimizing the gap between them and therefore forming the desired group.
The algorithmic rule is: => deduce the centroid of K clusters arbitrarily.
=> Then after, assign every component from within the input image to new cluster that closely resembles a particular cluster.
=> Then once more, work out through all the derived cluster's center. So that every segment has some cluster. Loop back and repeat the steps two and three till all the portions are traversed.

4. Feature Extraction

The process of features extraction plays a vital portrayal in disease symptoms identification. In several applications of image processing, feature extraction is employed. The components such as, color, segments, texture, edges, shades etc. are various distinguishable options which are then utilized in detection of any symptoms. According to Monica jhuria et al. these

components are crucial and the detection of any sickness in the plants becomes very easy using their results. According to her, morphological results from these parameters provide higher accuracy as compared to the opposite options. Texture of leaves is however the color only which is distributed over the image completely.

5. Classification

The fifth phase after feature extraction is classification that means the educational information pictures are classified using a neural network. The segmented features extracted from the output as image are taken as the inputs for this classification phase. The algorithms such as, back propagation are used for the optimum classification. It matches the information from the classified portions with the databases previously stored and helps in exact detection of the disease.

Sometimes the use of support vector machines i.e. SVM comes to existence. It creates a hyper plane amid knowledge set and portions that clustered earlier. The input is given as the feature vector to the classifier. Moreover these input vectors are classified into coaching and testing vectors. The executable program of classifier the works on these vectors for further processing.

PROPOSED WORK:

Plant disease detection have a significant role in today's era as with the development in every fields there is also an development in the plant disease as earlier there is a usage of the SVM algorithm where through this problem we can find out one popular disease instead of others but in this, there is a invention of the new program named KNN where we can find out more than one disease very easily and detect them.

In previous paper there are the steps which are taken and they are discussed as below:

1. Start
2. Style image input
3. Segmentation using K-mean algorithm
4. Feature extraction using GLCM
5. SVM (detection start)

TABLE I. DIFFERENT ALGORITHMS OF AUTHORS ACCORDING TO YEAR AND JOURNAL

Author	Year	Conferences /Journals	Brief	Algorithms
Pooja V, Rahul Das, Kanchana V	2017	IEEE	Identification of plant leaf diseases using SVM classifiers.	SVM classifiers
Wenjiang Huang, Qingsong Guan, Juhua Luo	2014	IEEE	Identifying and Monitoring Winter Wheat Diseases	RELIEF-F
Sachin D. Khirade and A. B. Patil	2015	IEEE	Plant Disease Detection Using Image Processing	K-Mean Clustering
Bharat Mishra, Mamta Lambert, Sumit Nema, Swapnil Nema	2017	IEEE	Recent Technologies of Leaf Disease Detection using Image Processing Approach	Genetic algorithms, Cuckoo Optimization
Zhang Jian and Zhang Wei	2010	IEEE	Support Vector Machine For Recognition Of Cucumber Leaf Diseases	SVM-RBF

These are the steps which are used in the previous papers and through these there is formation of only single disease.

In this paper, these are the steps which are used

1. Start
2. Input N numbers of images
3. Extract features of each image using GLCM
4. Training set formation

5. Using KNN algorithm

Through these steps there is detection of plant disease images instead of one.

CONCLUSION:

To conclude, as per the above discussion the correct detection and classification of the plant disease becomes vital in order to triple-crown the yield. This paper mentioned numerous phases and techniques that are useful for the initial disease detections. This paper conjointly mentioned some feature extraction, clustering, acquisition and classification techniques used to detect the exact diseases which are infecting either the leaves or stems of the plants.

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