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Detection of Citrus Plant Leaf Diseases Using Image Processing

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Abstract- **Agriculture is a most important and ancient occupation in India. As economy of India is based on agricultural production, utmost care of food production is necessary. Pests like virus, fungus and bacteria causes infection to plants with loss in quality and quantity production. There is large amount of loss of farmer in production. Hence proper care of plants is necessary for same. The disadvantage of prior systems method is it's confinement to citrus plants itself. So we propose to extend and generalize the learning aspect of citrus leaves classifier so that it can detect other plant leaves diseases too. For improving accuracy rate and time consuming.**

Keywords**: Agriculture, Citrus leaves, Classifier, Plant leaf diseases.**

I. INTRODUCTION

Agriculture is back bone of India wherein about 70% of the population depends on agriculture. Farmers have wide range of diversity to select suitable Fruit and Vegetable crops. However, the cultivation of these crops for optimum yield and quality produce is highly technical. It can be improved by the aid of technological support. Farmers have a great diversity of crops. The pathogens are present in the environment which severely affect the crops and the soil in which the plant is planted, thereby affecting the production of crops. The various diseases are observed on the plants and crops. The main identification of the affected plant or crop are its leaves. The various colored spots and patterns on the leaf are very useful in detecting the disease. The past scenario for plant disease detection involved direct eye observation, remembering the particular set of disease as per the climate, season. Plants become an important source of energy and only a primary source to the problem of global warming. The damage caused by emerging, re-emerging and endemic pathogens, is important in plant systems and leads to potential loss economically. The crop diseases contribute directly and indirectly to the spread of human infectious diseases and environmental damage. As these diseases are spreading worldwide causing damage to the normal functioning of the plant and also damaging the financial condition by significantly reducing the quantity of crops grown. The crop production losses its quality due to much type diseases and sometimes they occur but are even not visible with naked eyes. The main approach adopted in practice for detection and identification of plant diseases is naked eye observation of experts. The decision-making capability of an expert also depends on his/her physical condition, such as fatigue and eyesight, work pressure, working conditions such as improper lighting, climate etc. That's why this is not a proper way and also time consuming. It might be expensive as continuous monitoring of experts in large farms. When some diseases are not visible to naked eye but actually they are present, then it is difficult to detect it with the naked eye. And when it is visible it will be too late to detect disease and can't help anymore. Earlier, microscope is used to detect the disease, but it become difficult as to observe each and every leaf and plant. So, the fast and effective way is a remote sensing technique. Detection and recognition of diseases in plants using machine learning is very fruitful in providing symptoms of identifying diseases at its earliest. very few diseases have been covered, So, work needs to be extended to cove more diseases. The possible reasons that can lead to misclassifications can be as follows: disease symptoms varies from one plant to another, features optimization is needed, more training samples are needed in order to cover more cases and to predict the diseases more accurately. Plant diseases have turned into a nightmare as it can cause significant reduction in both quality and quantity of agricultural products, thus negatively influence the countries that primarily depend on agriculture in its economy. Consequently, detection of plant diseases is an essential research topic. Monitoring crops to detecting diseases plays a key role in successful cultivation. The naked eye observation of experts is the main approach adopted in practice which is expensive in large farms. Further, in some developing countries, farmers may have to go long distances to contact experts, this makes consulting experts to very expensive and time consuming. Therefore, looking for a fast, automatic, less expensive and accurate method to detect

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plant disease cases is of great realistic significance We initiate the following information related to the understanding of crop diseases.

CAUSES OF PLANT DISEASE

Non-infectious disease - caused by natural agencies Infectious disease - caused by pathogens. (Infectious means that which tends to spread from one plant to another or from one part of the plant to the other.)

II. LITERATURE SURVEY

According to the authors Pranjali B. Padol, Prof. Anjali A. Yadav[1] they use the method K-means Clustering to detect plant diseases. Where in this we First divide the dataset into K number of clusters and assign the data points randomly to the clusters. Then for each data point, calculate the Euclidean distance, from the data point to every cluster. If the data point is closest to its own cluster then leave it where it is. Shift it into the nearby cluster, if the data point is not closest to its own cluster. Repeat all steps until an entire pass through all the data point. Now the clusters become stable and the process of clustering will stop. If the data point is closest to its own cluster then leave it where it is. Shift it into the nearby cluster, if the data point is not closest to its own cluster. Repeat all steps until an entire pass through all the data points. Now the clusters become stable and the process of clustering will stop. According to the authors Ms. Kiran R. Gavhale, Prof. Ujwalla Gawande, Mr. Kamal O. Hajari [3] to the citrus leaf detection is Gray-Level Co-Occurrence Matrix (GLCM) is the statistical method of investigative texture which considers the spatial relationship of pixels . The GLCM functions characterize the texture of a leaf image by calculating occurrence of pixel in an image with specific values and in a specified spatial relationship. By creating a GLCM followed by extracting statistical measures from this matrix. The advantage is use of harmful chemicals on plants can be reduced. The disadvantage is consumes the time. According to the authors Nandhini M, Pream Sudha V, Vijaya MS[4], they use the method is Support vector machines (SVMs) are a set of related supervised learning methods used for classification and regression. A support vector machine constructs a hyper plane or set of hyper planes in a high-dimensional space, which can be used for classification, regression or other tasks. Intuitively, a good separation is achieved by the hyper plane that has the largest distance to the nearest training data points of any class called functional margin, since in general the larger the margin the lower the generalization error of the classifier. Classifying data is a common task in machine learning. Suppose some given data points each belong to one of two classes, and the goal is to decide which class a new data point will be in. In the case of support vector machines, a data point is viewed as a p-dimensional vector of a list of p numbers, and on to know whether one can separate such points with a $p - 1$-dimensional hyper plane. Decision tree learning is the process of learning decision trees from the labelled training examples. Decision tree classification algorithm generates the output as a binary tree like structure called a decision tree, where each non leaf node i.e., internal node denotes a test on an attribute, each branch represents an outcome of the test and each leaf node or terminal node holds a class label. The topmost node in a tree is the root node. A decision tree model contains rules which are used to predict the target variable. The class label of a new instance is predicted by testing the attribute values of the instance against the decision tree. A path is traversed from the root to a leaf node, which gives the class label of that data. Decision trees can be easily converted into classification rules.

III. METHODOLOGY

In the previous approaches the disadvantage of prior systems method is its confinement to citrus plants itself. So, we propose to extend and generalize the learning aspect of citrus leaves classifier so that it can detect other plant leaves diseases too. The main problem is that we just know only whether the leaf is healthy or not, it just gives us the damaged ratio of the leaf. We cannot know whether the leaf is defected or not, only on seeing with our naked eye. So, it is important to know the damage ratio of the leaf. But the drawback is it just only give the damage ratio, it does not give any information regarding whether the leaf is cured or not, and we also don't know how to cure it. In this project we can over come the drawback on using classification we can know the type of disease and we can also know how to cure using pesticides and we can also know the quantity of pesticides to cure the damaged leaf. The first step is the captures the image and given to the input image. And then next it is converted into the RGB to gray colour. It shows the damaged mask and then using to the feature extraction. In this feature extraction is used to the SFIT algorithm. Finally, the result is detection of diseases. Feature Extraction: Feature extraction plays an important role for identification of an object. Drawing out specific features from the pre-processed Images is called feature extraction. Feature extraction plays a vital role in data mining. It can be used to improve the classification effectiveness and computational efficiency. Feature extraction is carried out with all the pre-processed leaf images. Three types of features such as colour, texture and shape features are extracted in this work in order to extract the prominent features of an imageIn many application of image processing, feature extraction is used. The features which can be used in plant disease detection. Monica jhuria et al considers color, texture and Morphology as a feature for

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disease detection. They have found that morphological result gives better result than the other features. Texture means how the color is distributed in the image, the roughness, hardness of the image. It can also be used for the detection of infected plant areas. Color, texture, morphology, etc. are the features which can be used in plant disease detection. Image Segmentation is the partitioning of the digital image in a multiple segments. It has set as pixels, such as super pixels. The goal of segmentation is the representation of the image and easier to analyse. A region of interest is a portion of an image that you want to filter or perform some other operation. It define the ROI by creating the binary mask. Which is a binary image that is same size as the image. Most of the methods include pre-processing followed by feature extraction in detection of diseases. Neural network classifier to classify leaves disease has been chosen as classification tools. Color Co-occurrence for feature extraction is also proved to be helpful in many of plant diseases detection based on color and texture. these techniques in other applications like agricultural robot is another boon to farmer and society. A novel cloud computing for smart farming has been proposed including robotics and video processing on tomato plant. Here use of Internet of things importance with agricultural world has been told. Also using various controllers or processor in agricultural robot for detection of plant disease has become interesting concept. Image segmentation is an important aspect of digital image processing. It may be defined as a process of assigning pixels to homogenous and disjoint regions which form a partition of the image that share certain visual characteristics. The major goal of segmentation is to simplify or change the representation of an image into meaningful image that is more proper and easier to explore. Segmentation is essentially a collection of methods that allows spatial partitioning to the close parts of the image as objects.

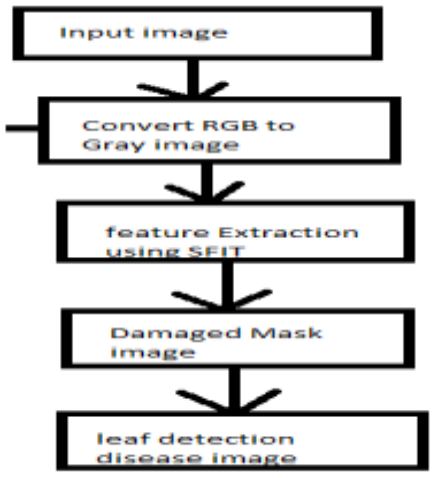

Fig 1: Proposed System

Experimental Results :

Our project mainly focused on the SFIT algorithm. In this algorithm used for the feature extraction. Scale invariant feature transform (SIFT) is a feature based object recognition algorithm. The intuition behind it is that a lot of image content is concentrated around blobs and corners. This algorithm first take the input image.

Fig 2 : input Image

And then image is converted in RGB to gray Convert the RGB image to gray image: It uses the feature extraction using the SFIT algorithm.

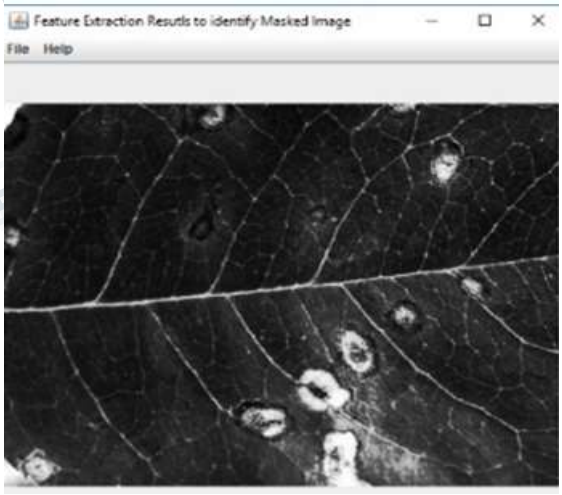

Fig 3: Gray image

Fig 4: Damaged Mask Image

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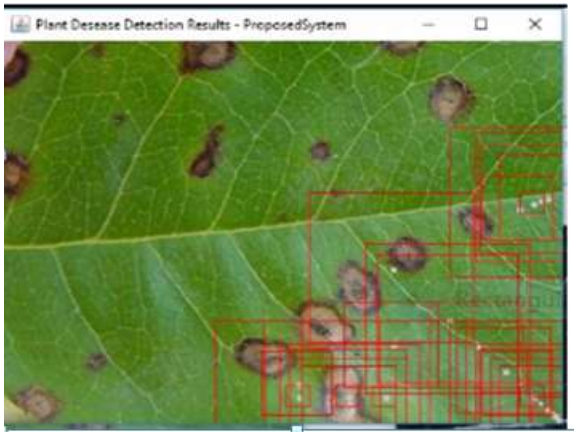

Fig 5: Final result

IV. CONCLUSION

Here in this project we propose to extend and generalize the learning aspect of citrus leaves classifier so that it can detect other plant leaves diseases too. to describe point features are mainly dependent on the description of image blocks , such as SIFT (Scale Invariant Feature Transform) method . The pieces of literature in recent years indicated that the researchers attached more and more importance to the improvement of SIFT-based matching accuracy while limiting the computation volume. The method of image feature description plays a vital role in the quality of image. It using separator functions and for improving accuracy and extending the functionality.

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