

## Plant Disease Detection using Image Processing

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*Abstract*— As farming sector, if we observe then there is not much technology used. So far to protect the plant from pre-occurring of diseases there is no such implementation. For that by using concept of image processing we are going to identify the type of disease and ways to protect it from getting fully destroyed. Implementation will be on leaf of plant and its feature which are captured. Image processing includes the concept of image segmentation, enhancement and color space conversion firstly image digital image is enhanced by filter. The captured image goes through all this process so that further implementation on that can be carried out. Further image is segmented to a meaning full part which is easier to analyze. The software system coded on the platform to define certain type of features for classification of the images captured.

**Key words:** Plant Disease Detection, Image Processing

### I. INTRODUCTION

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. In addition, 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. Farmers estimate the diseases by their experience but this is not proper way. 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. So, we need a fast way and remote sensing form to protect the crop from disease.

The ordering and recognition of crop diseases are of the major technical and economic importance in the agricultural Industry. The main diseases of plants are viral, fungus and bacterial disease. The viral disease is due to viral changes in environment, fungus disease is due to the presence of fungus in the leaf and bacterial disease is due to presence of germs in leaf or plants. Automatic recognition of plant diseases is an important research topic these days as it may prove benefits as repeatedly detect the diseases from the symptoms that appear on the plant leaves.

For that by using concept of image processing we are going to identify the type of disease and ways to protect it from getting fully destroyed. Implementation will be on leaf of plant and its feature which are captured. This project

is mainly developed different digital image processing techniques to detect the plant diseases.

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### II. LITERATURE SURVEY

Most of the people in the India are farmers. They depend on the agriculture. Agriculture is a changing social and economic environment day to day. Let's have a brief overview of the various papers, which we have referred for implementation of our project. The usage of image processing technology for plant disease degree grading eliminates the subjectivity of traditional classification methods and human-induced errors.

Health monitoring and disease detection on plant is very critical for sustainable agriculture. It is very difficult to monitor the plant diseases manually. It requires tremendous amount of work, expertise in the plant diseases, and also require the excessive processing time. Hence, image processing is used for the detection of plant diseases.

### III. EXISTING SYSTEM

Existing this type of system is not being used, this all activity of observing and detecting the disease this all process is done by manually. Means farmer has to go there and check manually whether any type of disease is being occurred or not. On that basis farmer after all this time consuming process decide how to protect the plant from getting degraded. The disadvantages of this system are more manpower needed for observing also treatment was done on plant after getting affected.

### IV. PROPOSED SYSTEM

Proposed system is Digital technology that can make it very easy task to process various types of disease images of leaf very accurately. System will also give the power to automatically sense the diseases without having an expert on the farmland. System will use KNN Algorithm.

System will be designed on basis of K Nearest Neighbor (KNN), which will give a clear idea about the changes in the leaf of plant. Which will work as, Sector by sector each portion will be checked by considering x and y directions in order to find the changes, if any on the leaf.

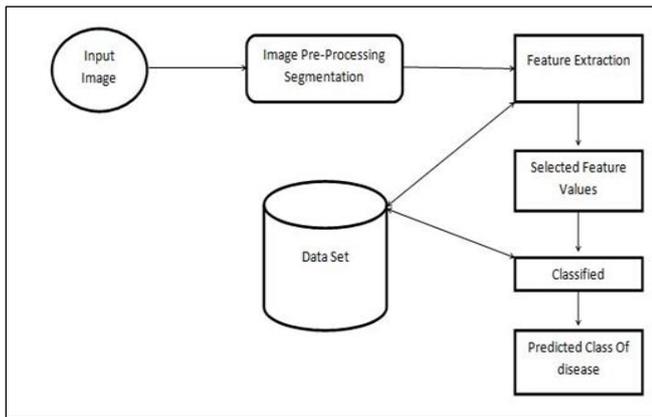


Fig. 1: Flow Architecture of Proposed System

The proposed system uses digital image processing which has three basic steps- image processing, analysis and understanding. In this, at first identification of the changes in leaf of plant with next image taken after a period of time. If the picture is having changes and differentiation then it means that plant is caused to some type of disease. Back propagation method is going to be used for comparing the two images with each other so that changes would be identified and solution about it can be given. System will be designed on basis of K Nearest Neighbor (KNN), which will give a clear idea about the changes in the leaf of plant. Sector by sector each portion will be checked by considering x and y directions in order to find the changes if any on the leaf.

#### A. Steps

- Image will be captured by camera and will be uploaded to system.
- The captured image will be segmented and processed for further activity.
- It will diagnose the affected part of plant by KNN algorithm.
- Then the difference of affected part can be detected and caused disease of the plant will be identified.
- After showing the affected area it will diagnose the image for the disease and sort of solution.

### V. REQUIREMENTS

#### A. Hardware Specifications

- RAM : Min. 2 GB RAM and above
- Dual Core Processor and above
- Camera

#### B. Software Specifications

- Windows 7
- Microsoft Office
- Microsoft Visual Studio

### VI. ADVANTAGES

- Treatment was done on plant before getting affected.
- Helpful to farmer to pre-curing the plants from disease.
- No wastage of crop and man work will be done.
- System will help to reduce the overall man work of farmer.

- It is beneficiary for large area farms.
- Will help in production of export quality crops.

### VII. CONCLUSION

Overall this project implements KNN technique for training of neural network based plant diseases. This project is mainly developed for different diseases classification techniques used for plant leaf disease detection and an algorithm for image segmentation technique that can be used for automatic recognition as well as organization of plant leaf diseases later. Banana, beans, jackfruit, lemon, mango, potato, tomato, and sapota are some of those ten species on which proposed algorithm is tested. Therefore, related diseases for these plants were taken for identification. With very less computational efforts the optimum results were obtained, which also shows the efficiency of proposed algorithm in recognition and classification of the leaf diseases. Another advantage of using this method is that the plant diseases can be identified at early stage or the initial stage. To improve recognition rate in classification process Artificial Neural Network, Bayes classifier, Fuzzy Logic and hybrid algorithms can also be used. System would be able to find disease from the leaf of plant so we can pre-protect it from getting spoiled, as it will help the Farmer a lot for maintaining the production and quality of crops.

### VIII. APPLICATIONS

Our technique will surely help the farmers to make their farm inspired by technology so that stress will be low. Their manual work will be automated and it will reduce the stress of farmer and definitely help them to work on larger farm. Image processing techniques could be applied on various applications as follows:

- 1) To detect plant leaf, stem, and fruit diseases.
- 2) To quantify affected area by disease.
- 3) To find the boundaries of the affected area.
- 4) To determine the color of the affected area
- 5) To determine size & shape of fruits

### IX. FUTURE SCOPE

The future research topics are aimed at deciding the drawbacks in the current work and to add some innovative originations to the project. The main drawback in the current work is the background dependent image processing. I.e. during the image acquisition, leaf background should be organized in such a way that it delivers adequate contrast to the leaf and the diseased part of the leaf so that a proper segmentation can be achieved. The future work aims at a real time image acquisition directly in the agricultural field and the implementation should be able to distinguish the background and the leaf area. Implementation of the robotic arm is planned as future advancement to this research topic. This implementation provides an autonomous robot which would be able to survey the agricultural field and identify the disease of the plants. The recognized diseases will be repeatedly updated to the disease database which would be transferred to the farmer. The vehicle carrying the robotic arm could be a tractor in case of the fields with spacious

crops like mango. In situation of the other crops where the tractor cannot move inside the field, a line following robot is implemented to carry the robotic arm. There is no special arrangement needed to create the lines inside the field for robot movement, drip irrigation pipes used inside the field will provide the direction for the robot movement inside the field. GSM used in future.

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