International Journal of Research in Engineering, Science and Management
Volume-2, Issue-11, November-2019
www.ijresm.com | ISSN (Online): 2581-5792

Implementation of Digital Image Processing for Plant Leaf Disease Detection

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***Abstract*: Identification of the plant diseases is the key to preventing the losses in the yield and quantity of the agricultural product. The studies of the plant diseases mean the studies of visually observable patterns seen on the plant. 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, expertize in the plant diseases, and also require the excessive processing time. Hence, image processing is used for the detection of plant diseases. Disease detection involves the steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification. Detecting plant diseases on leaf of plant at early stages gives strength to overcome it and treat it appropriately by providing the details to the farmer that which prevention action should be taken.**

***Keywords*: Digital Image Processing, leaf diseases, classification, SVM, K-Means Segmentation.**

1. Introduction

India is an agricultural country and the position of any country in the world depends on its agricultural production. In India the farmers have wide variety to select their plant for cultivation to produce maximum yield depending on environment available. Then also the production gets affected by diseases of the crop. The diseases of the plant are caused by pathogens, insufficiency of nutrients, fungus etc. Detecting diseases at early stages enables to overcome it and treat it appropriately. For this an expert is required for identifying the disease, describe the method of treatment and protection. Identifying the plant disease is not easy task. It requires experience and knowledge of plants and their diseases. It also requires correct result in describing the symptoms of plant diseases. A person can depend on a system which has experience and knowledge, called an Expert System. An expert system can be:

- Agricultural advisor
- An excellent farmer
- Electronic or Computerized expert system

An excellent farmer precisely catches the change of the crops in the growing process and they manage the cultivation in proportion to the change in order to cultivate the agricultural products of high quality. Since sensing the delicate change of crops is obtained through the observation by the visual sense in their long cultivation experience, it is difficult for them to transmit the understood technique to future generations as a general cultivation one [2]. If farmers decide to take advice from agricultural expert regarding the treatment of incidence of pest /disease/trait to their crop/plant in order to increase the crop productivity then he may face following situations:

- Sometimes they have to go long distances for approaching the expert.
- Expert may not be present at that time even though they go long distances.
- Sometimes, the expert whom a farmer contacts, may not be present in that location to give opinion to the farmer with the information and knowledge.

The expert advice is very costly and time consuming. Electronic expert systems enable farmers in identifying type of diseases; making the right decision and selecting the proper treatment. The expert systems are smart computer programs that are capable of serving solutions or suggestion related to specific problems in given area. One of the advantages of using Electronic expert systems is its capability to reduce the information that users need to process, reduce personnel costs and increase throughput. Expert system performs work more consistently than human experts [1].

2. Literature review

The feature extraction is done in RGB, HSV, YIQ and Dithered Images. The feature extraction from RGB image is added in the suggested system. A new automatic method for disease symptom segmentation in digital photographs of plant leaves. The diseases of different plant species have mentioned. Classification is done for few of the disease names in this system. The disease recognition for the leaf image is performed in this work.

Study and analysis of cotton leaf disease detection using image processing work is carried on. The k means Clustering algorithm is used for segmentation. The k-means concept is added to the proposed system which will divide the leaf into

different clusters. The survey of disease identification on COTTON leaf is done. Comparison of different detection technique of leaf disease detection is mentioned. SVM and k-means clustering has used in this system.

An identification of variety of leaf diseases using various data mining techniques is the potential research area. The diseases of different plant species have mentioned. Classification is done for few of the disease names in this system. The concept SVM for classification is used in this system [4]. There are various method of image processing for plant disease detection is discussed.

The vegetation indices from hyper spectral data have been shown for indirect monitoring of plant diseases. But they cannot distinguish different diseases on crop. Wenjiang Huang et al developed the new spectral indices for identifying the winter wheat disease. They consider three different pests (Powdery mildew, yellow rust and aphids) in winter wheat for their study. The most and the least relevant wavelengths for different diseases were extracted using RELIEF-F algorithm. The classification accuracies of these new indices for healthy and infected leaves with powdery mildew, yellow rust and aphids were 86.5%, 85.2%, 91.6% and 93.5% respectively [5]. Enhanced images have high quality and clarity than the original image. Color images have primary colors red, green and blue. It is difficult to implement the applications using RGB because of their range i.e. 0 to 255. Hence they convert the RGB images into the grey images. Then the histogram equalization which distributes the intensities of the images is applied on the image to enhance the plant disease images.

Monica Jhuria et. al. uses image processing for detection of disease and the fruit grading in [5]. They have used artificial neural network for detection of disease. They have created two separate databases, one for the training of already stored disease images and other for the implementation of the query images. Back propagation is used for the weight adjustment of training databases. They consider three feature vectors, namely, color, textures and morphology [5]. They have found that the morphological feature gives better result than the other two features.

Wan Mohd Fadzil et. al. [5], discussed a disease detection method for orchid plant leaves. The orchid plant leaflet images are received the usage of digital camera. The algorithm makes use of an aggregate of various strategies inclusive of border segmentation method, morphological processing and filtering technique used for categorizing input images into two disease class as black leaf spot and solar scorch.

Vijay Jumb et. al. [5], discussed a techniques of segmentation victimization Otsu's thresholding and K-means clustering. The first images area units regenerate to HSV color space and therefore the V part is used for multi-thresholding. The projected work compares this segmentation technique with different techniques like fuzzy C-means, region growing etc. These techniques area unit compared using two metrics i.e. peak signal to noise magnitude relation (PSNR) and mean sq. error (MSE).

Rong Zhou et. al. [5], explained method for resilient and advance identify of leaflet patch in sugar beet. For capturing images, Nikon photographic camera was used that was mounted on a stand to stay constant distance. The author used white background whereas capturing images to avoid the additional complications in process. The method implements hybrid methods of guide matching and support vector machine. This technique usage color primarily forms options for segmentation, orientation code matching and support vector machine classifier for final malady classification.

3. Key issues and challenges in the field of disease analysis

Many researchers had done research on various plants and their diseases also they had given some techniques to identify that disease. Automation of identifying disease entails the input date collected from different sources. In this review, considering all different research papers we are identifying and discussing key issues, challenges on disease and techniques are as follows.

- Quality image of plant leaves
- Data set need to be considered in large amount.
- Acquired images are affected by background data and noises.
- Segmenting the exact spot in a leaf into meaningful disease. Preparation of training and testing samples from input image.
- Classification plays a role in recognizing segmented spot into meaningful disease.
- Color of plant leaf, size and texture are varying when climate changed.
- Regular observation is needed for particular plants.
- Identifying diseases for different plant leaves is challenging.
- Reviews suggest that image processing and machine learning techniques have more potential to find diseases so, there has to be improving in existing research.

4. Conclusion

This paper presented an overview on digital image processing for plant leaf disease detection.

References

[1] Sachin D. Khirad, A. B. Patil "Plant Disease Detection Using Image Processing", 2015 IEEE.
[2] Prof. H.M. Deshmukh, Jadhav Sanjivani, Lohar Utkarsha, Bhagat Madhuri, Salunke Shubhangi "Plant Leaf Disease Identification System for Android," International Journal of Advanced Research in Computer and Communication Engineering Vol. 5, Issue 3, March 2016.
[3] Prakash M. Mainkar, Shreekant Ghorpade, Mayur Adawadkar "Plant Leaf Disease Detection and Classification Using Image Processing Techniques," International Journal of Innovative and Emerging Research in Engineering, 2015.

[4] Sujatha R, Y Sravan Kumar and Garine Uma Akhil “Leaf disease detection using image processing” Journal of Chemical and Pharmaceutical Sciences, January - March 2017.
[5] C. G. Dhaware and K. H. Wanjale, "A modern approach for plant leaf disease classification which depends on leaf image processing," *2017 International Conference on Computer Communication and Informatics (ICCCI)*, Coimbatore, 2017, pp. 1-4.
[6] R. M. Prakash, G. P. Saraswathy, G. Ramalakshmi, K. H. Mangaleswari and T. Kaviya, "Detection of leaf diseases and classification using digital image processing," *2017 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS)*, Coimbatore, 2017, pp. 1-4.