Indo-Iranian Journal of Scientific Research (IIJSR)
(Peer Reviewed Quarterly International Journal) Volume 2, Issue 4, Pages 37-42, Oct-Dec 2018

A Study on Identification of Unhealthy Plant Leaves using Image Processing with PCA, LDA Techniques

K.Mohanapriya[1], Mr.M.Balasubramani[2]

[1]*PG Scholar, Department of ECE, Vivekanandha College of Engineering for Women, Namakkal, India. Email: mohana632@gmail.com*
[2]*Assistant Professor, Department of ECE, Vivekanandha College of Engineering for Women, Namakkal, India. Email: mskbalasubramani@gmail.com*

Article Received: 29 May 2018 *Article Accepted: 22 September 2018* *Article Published: 06 October 2018*

ABSTRACT

India is a rural nation and around 70% of our population depends upon horticulture. 33% of our national pay originates from agribusiness. So the disease location of plants assumes a critical part in the farming field. Dominant part of the plant sicknesses are caused by the attack of microbes, growths, infection and so forth. On the off chance that appropriate care isn't taken around there, it may lead to serious effects on plants and adversely affects the productivity and quality. To recognize, the plant diseases we require a quick programmed way. The main approach is to detect and identification of plant infections using image processing with PCA and LDA techniques. Image processing toolbox of Matlab is used for measuring affected area of disease and to determine the difference in the color of the disease through experts. So this technique is time consuming and less efficient. Here, a project is proposed with an idea of detecting plant diseases using image affected area. This concept can be extended to detect the symptoms of any type of plant diseases that is affected on different horticulture crops. The algorithm can be used to classify the leaves and the classified outcomes result can be viewed in simulation. This reduces an important task of monitoring of farms crops at very early stage itself to detect the symptom of diseases appear on plant leaves.

Keywords: Image processing, PCA, LDA, MATLAB.

1. INTRODUCTION

Agribusiness is the mother all things considered. It has played a key job in the advancement of human development. The farming generation framework is a result of an unpredictable interaction of soil, seed and agro chemicals including fertilizers. As diseases of the plants are unavoidable, distinguishing diseases assumes a noteworthy job in the field of agribusiness. Plant pathogens comprise of parasites, life form, microbes, infections, phytoplasmas, viroids and so forth., three parts are completely important for diseases to happen in any plant framework and which may take a wide range of plant tissues counting leaves, shoots, stems, crowns, roots, tuber, organic products, seeds, and vascular tissues. Therefore, detection and classification of diseases is an important and urgent task.

The naked eye perception of specialists is the primary methodology received by and by for discovery and identification of plant diseases. Further, in some making countries, farmers may need to go long distances to contact experts, this makes guiding authorities unnecessarily expensive and time consuming. At the point when crops suffered infection, if the indications are not evident or more unpredictable, it will be exceptionally hard to recognize the attributes with the goal that postpones the powerful control of product illnesses truly. We can investigate the picture of infection leaves by utilizing image processing technology and concentrate the highlights of sickness spot as per shading, surface and different attributes from a quantitative perspective.

This strategy is extremely difficult, tedious and unrealistic for substantial fields. So a quick and exact way to deal with recognize the plant sicknesses is required. A few analysts have utilized picture handling strategies for quick and exact discovery of plant diseases. The steps followed by these researchers in detection of leaf diseases are

image acquisition, image pre-processing, disease spot segmentation, feature extraction and disease classification. The precision of result depends upon techniques utilized for diseases spot identification.

2. LITERATURE REVIEW

Arya M S, Anjali K (2018) presents the technique of genetic algorithm with Otsu segmentation. The Otsu's segmentation is used to separate the affected areas using various image parameters. This algorithm contain five steps: Image acquisition is the first step that requires capturing an image with the help of a digital camera. Preprocessing of input image to move forward the quality of image and to remove the undesired distortion from the image. To improve the contrast Image enhancement is also done. In this step, mostly green colored pixels, are masked. In this, we computed a threshold value that's utilized for these pixels. At that point within the taking after way for the most part green pixels are masked: if pixel intensity of the green component is less than the pre-computed threshold value, at that point zero value is assigned to the red, green and blue components of the this pixel. In the infected clusters, inside the boundaries, remove the masked cells. Get the valuable portions to classify the leaf diseases. Segment the components using genetic algorithm The Co-occurrence features are calculated after mapping the R, G, B components of the input image to the thresholded images. The main disadvantage is time complexity and coding can be complex to get it.

Sonal P Patel, Arun Kumar Dewangan (2017) examined the various classification techniques used for plant disease identification. The methods which are essentially used for the detection and classification of leaf disease in plants which are K means clustering for segmentation method, artificial neural network, Probabilistic Neural network and GLCM and SGLDM for texture feature analysis. There are few of the challenges show up in these techniques are, it requires huge dataset for classification and diseased symptoms are varies. Therefore, some stages variety of disease has same symptoms then the classification technique may not be able to classify the proper disease. So, there's scope for more improved methods.

Rajneet Kaur, Manjeet Kaur (2017) appears SVM is very complex in calculations and it is not the cost effective testing of each instance and inaccurate to wrong inputs. KNN algorithm is effectual classifier would be used to minimize the computational cost. In past investigates it has proved that KNN has high accuracy rate. KNN classifier obtains greatest result as compared to SVM.

Lakhvir Kaur, Dr. Vijay Laxmi (2016) presents an algorithm, an enhancement on different methods such as Kth-Nearest Neighbor with Neural Network and Naive Bayes are compared and hybrid in classification of image analysis to improve grading and accuracy of result. So, the post-processing of leafs are the detection of visual defects in order to classify the infected part depending on their appearance. The approach based on decision tree gives the worst results because of the over fitting problem.

Sachin B.Jagtap, Shailesh M.Hambarde (2014) shows usefulness of integration of an image analyzer aided with pattern recognition within a diagnostic expert system model. In order to diagnose a disorder from leaf image four image processing phases have to be applied: Image enhancement, Image segmentation, Feature extraction, & classification. In order to employ system we first have to train it with a set of images of disorders. Applying this model to any other crop disorder requires only spatial care to be taken in order to acquire a sufficient set of images for training purpose as representative of these disorders. Due to integration of this system diagnosis accuracy will increase. It focuses on specific disorder's identification, it can be extended in order to include more disorders. Extension of system in such a way that it will be capable to detect and identify abnormalities on the other parts of plants also e.g. fruit, stem, & root.

Savita N. Ghaiwat and ParulArora (2014) examined the different classification techniques that can be used for plant leaf disease classification. For given test example, k-nearest-neighbor (KNN) method is seems to be suitable as well as the simplest of all algorithms for class prediction. If the training data is not linearly separable, then it is difficult to determine optimal parameters in SVM, which appears as one of its drawbacks and SVM is more complex to understand and implement. The main disadvantage of KNN algorithm is that it is a slow learner and also it is not robust to noisy data.

Sanjay B. Dhaygude, Nitin P.Kumbhar (2013) there are mainly four steps in developed processing scheme, out of which, first one is, for the input RGB image, a color transformation structure is created, because this RGB is used for color generation and transformed or converted image of RGB, that is, HSI is used for color descriptor. In second step, by using threshold value, green pixels are masked and removed. In third, by using precomputed threshold level, removing of green pixels and masking is done for the useful segments that are extracted first in this step, while image is segmented. And in last or fourth main step the segmentation is done.

S. Arivazhagan, R. Newlin Shebiah (2013) disease identification process include some steps out of which four main steps are as follows: first, for the input RGB image, a color transformation structure is taken, and then using a specific threshold value, the green pixels are masked and removed, which is further followed by segmentation process, and for getting useful segments the texture statistics are computed. At last, classifier is used for the features that are extracted to classify the disease. The proposed algorithm shows its efficiency with an accuracy of 94% in successful detection and classification of the examined diseases. The robustness of the proposed algorithm is proved by using experimental results of about 500 plant leaves in a database.

Smitha Naikwadi, Niket Amoda (2013) histogram matching is used to identify plant disease. In plants, disease appears on leaf therefore the histogram matching is done on the basis of edge detection technique and color feature. Layers separation technique is used for the training process which includes the training of these samples which separates the layers of RGB image into red, green, and blue layers and edge detection technique which detecting

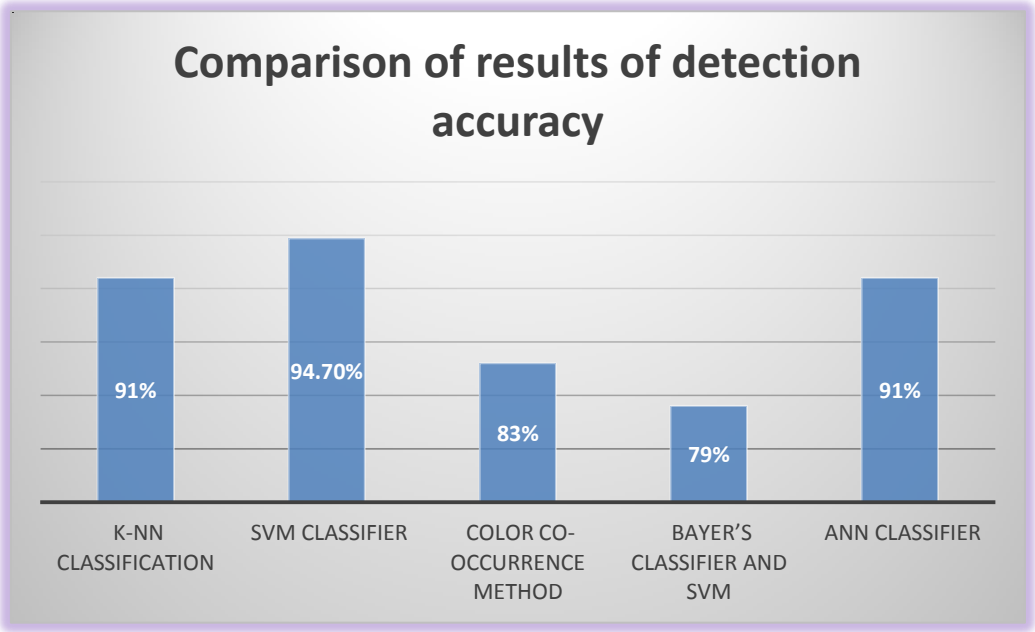
edges of the layered images. Spatial Gray-level Dependence Matrices are used for developing the color co-occurrence texture analysis method.

Anand H. Kulkarni, Ashwin Patil R.K (2012) presents a methodology for early and accurately plant diseases detection, using artificial neural network (ANN) and diverse image processing techniques. As the proposed approach is based on ANN classifier for classification and Gabor filter for feature extraction, it gives better results with a recognition rate of up to 91%. An ANN based classifier classifies different plant diseases and uses the combination of textures, color and features to recognize those diseases.

Sabah Bashir, Navdeep Sharma (2012) presents disease detection in Malus domestica through an effective method like K-mean clustering, texture and color analysis. To classify and recognize different agriculture, it uses the texture and color features those generally appear in normal and affected areas. In coming days, for classification purpose given classifiers can also be used, like K-means clustering, Bayes classifier and principal component classifier.

Mrunalini R.Badnakhe, Prashant R.Deshmukh (2011) presents the technique to classify and identify the different disease through which plants are affected. In Indian Economy a Machine learning based recognition system will proves to be very useful as it saves efforts, money and time too. The approach given in this for feature set extraction is the Color Co-occurrence Method. For automatic detection of diseases in leaves, neural networks are used. The approach proposed can significantly support an accurate detection of leaf, and seems to be important approach, in case of stem, and root diseases, putting fewer efforts in computation.

COMPARISON OF RESULT ACCURACY



 ISSN: 2581-4362

S.No	Methods	Comparison of results of detection accuracy
1	K-NN classification	91%
2	SVM classifier	94.7%
3	Color Co-occurrence method	83%
4	Bayer's classifier and SVM	79%
5	ANN classifier	91%

3. CONCLUSION

The main approach of this paper is to recognize the diseases. Speed and accuracy are the important characteristics required for disease identification. From the above literature review it is found that the different methods used by different researchers to detect the unhealthy plant leaves. This paper reviewed the recent techniques to identify the diseases at an early stage. The result of the review shows the different techniques of detection accuracy. Future work will focus on identification of unhealthy plant leaves at an early stage based on PCA and LDA techniques.

REFERENCES

[1] Arya M S and Anjali K, "*Detection of Unhealthy region of plant leaves using image processing and Genetic algorithm with Arduino"* 2018 International Conference on Power, Signals, Control and Computation (EPSCICON) doi:10.1109/ EPSCICON.2018.8379584.

[2] Sonal P Patel, Arun Kumar Dewangan, "*A Comparative Study on Various Plant Leaf Diseases Detection and Classification"* International Journal of Scientific Research Engineering & Technology (IJSRET), ISSN 2278 – 0882 Volume 6, Issue 3, March 2017.

[3] Rajneet Kaur, Manjeet Kaur, "*A Brief Review on Plant Disease Detection using in Image Processing"* International Journal of Computer Science and Mobile Computing, Vol.6 Issue.2, February- 2017.

[4] Lakhvir Kaur, Dr. Vijay Laxmi, "*Detection of Unhealthy Region of plant leaves using Neural Network"* International Journal of Latest Engineering Research and Applications (IJLERA) ISSN: 2455-7137 Volume – 01, Issue – 05, August – 2016, PP – 34-42.

[5] Sachin B. Jagtap, Shailesh M. Hambarde, "*Agricultural plant leaf disease detection and diagnosis using image processing based on morphological feature extraction"* IOSR Journal of VLSI and Signal Processing (IOSR-JVSP) Volume 4, Issue 5, Ver. I (Sep-Oct. 2014), PP 24-30.

[6] Savita N. Ghaiwat, Parul Arora *"Detection and Classification of Plant Leaf Diseases Using Image processing Techniques: A Review"*, International Journal of Recent Advances in Engineering & Technology, ISSN (Online): 2347 - 2812, Volume-2, Issue - 3, 2014.

[7] Prof Sanjay B. Dhaygude Mr. Nitin P. Kumbhar, "*Agricultural plant Leaf Disease Detection Using Image Processing"* International Journal of Advanced Research in Electrical Electronics and Instrumentation Engineering vol. 2 no. 1 January 2013.

[8]S. Arivazhagan, R. Newlin Shebiah, "*Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features"* CIGR Journal of Agricultural Engineering, Vol. 15, No.1: 211－217, March 2013.

[9] Smita Naikwadi, Niket Amoda, *"Advances in image processing for detection of plant diseases"*, International Journal of Application or Innovation in Engineering & Management , Volume 2, Issue 11, November 2013.

[10] S. Phadikar, J. Sil, and A. K. Das ,*"Classification of Rice Leaf Diseases Based on Morphological Changes"*, International Journal of Information and Electronics Engineering, Vol. 2, No. 3, May 2012.

[11] Anand.H.Kulkarni, Ashwin Patil R. K. *"Applying image processing technique to detect plant diseases",* International Journal of Modern Engineering Research, Vol.2, Issue.5, Sep-Oct. 2012 pp-3661-3664.

[12] Sabah Bashir, Navdeep Sharma *"Remote Area Plant Disease Detection Using Image Processing",* IOSR Journal of Electronics and Communication Engineering, ISSN : 2278-2834 Volume 2, Issue 6 ,2012, PP 31-34.

[13] Mrunalini R. Badnakhe and Prashant R. Deshmukh *"An Application of K-Means Clustering and Artificial Intelligence in Pattern Recognition for Crop Diseases",* International Conference on Advancements in Information Technology 2011 IPCSIT vol.20 (2011).