A Survey on: Different Plant Leaf Disease Detection Techniques in Agriculture

Prof. Swati Pawar1, Prof. Vivek D. Ugale2, Harshal Patil3, Kiran Sujgure4, Nilesh Dhepale5

Sandip Foundation’s, Sandip Institute of Technology and Research Center, Nashik

12345Department Of Electronics and Telecommunication Engineering

**ABSTRACT** - India is a global agricultural powerhouse, in Indian agriculture a variety of crops are seen. The major part of Indian economy is based on agricultural products, there are many reasons which affect the quality and quantity of agricultural products, climate change is one of the reasons, which causes disease and which ultimately turn into reduction of quality and quantity of agricultural products. In this paper we have reviewed papers in which the identification and classification of leaf diseases is studied. There are many classification techniques mentioned in this paper for identification and classification of plant leaf disease detection, like CNN, Image Processing, K-Mean Clustering, SVM etc.

**Keywords** - CNN, Disease, Image Processing, K-Mean Clustering, SVM.

**INTRODUCTION**

As per the survey of 2018, India stands 2nd in worldwide agricultural production. Agriculture employed more than 50℅ of the Indian work forces and contributed 17 – 18% to country's GDP. India ranks first in the world with highest net cropped area followed by US and China, in India different States have taken a variety of crops. Plant diseases are the major contributors to reduce the potential of crop plants and ultimately reduce the production of agriculture products. Annual losses of crop produce in India are estimated at 25% (NAAS, 2008), this indicates importance and need for strengthening of the existing biosecurity system more, so with the advances agriculture.

Each plant has a different type of disease found, so it takes a lot of effort and expert people to take care of those plants. In many parts of the country farmers don’t have proper facilities and even an idea that they contact experts. Also, the consultation cost of experts is very high which adds additional economic burden on the farmer. The process of consultation is also time consuming [3]. Therefore, it is necessary to develop cost effective technology to monitor the plants, which detect and identify the diseases, insect pests, etc. Once the disease is identified, farmers can take necessary actions and precautions accordingly. As the rapid development of software and hardware technology, the application of image processing in agriculture has been developed [14]. In Image Processing the image of the affected leaf of the plant is processed to identify the disease.

**LITERATURE SURVEY**

 Here, various papers describing detection of various plant leaf diseases are studied.

In paper [1], authors Kaushik N, Nikhil K G, Sulagna Sarkar implemented leaf disease detection technique and soil condition monitoring system using CNN. In this paper the digital image processing is integrated with machine learning concept which is achieved with the help of python to detect soil condition, leaf diseases, temperature and moisture of the soil. CNN classifier is used to classify the images based upon their image characteristics. Author implemented an IOT based sensor to measure temperature and moisture of the soil to make the system effective.

In paper [2], authors Faye Mohameth, Chen Bingcai, Kane Amath Sada implement a deep learning method to identify plant leaf disease, in which 3 deep learning models like VGG16, Google Net, ResNet 50 used to get good accuracy. Using SVM and CNN classifiers features were extracted, results of DL methods VGG16, Google Net, ResNet 50 came out with accuracy 97.82%, 95.3%, 95.38% respectively.

In paper [3], by authors Mr. Ashish Nage, Prof. V. R. Raut implemented leaf disease detection and identification based on python by

using image processing. They proposed a system which is capable of detecting the disease in the early stage of growth of disease on the crop, which saves the loss and yield.

In paper [4], authors Shantanu Kumbhar, Amita Nilawar, Shruti Patil proposed a system that classifies the leaf image using image classification algorithm CNN. The user takes the images of the leaf and uploads in the system which detects the disease and also suggests to the user which pesticides the user has to use as a preventive measure.

In paper [5], by Abirami devaraj, Karunya Rathan, they implemented and studied on Alternaria alternata, anthracnose, bacterial blight and cercospora leaf spot, which is automatically detected by the image processing using MATLAB, Developing an automatic system for farmers for detection of disease in initial stages of crops.

In paper [6], by Peng Jiang, Yuehan Chen, Bin Liu, Dongjin He, they proposed an apple leaf disease recognition method based on real-time detection using improved CNN classifier in deep learning method. In this paper, they have an image dataset which collected from a laboratory and a real apple field, the dataset contains 90% of diseased leaves images, and by Using CNN classifier they recognize and detect the disease having a high accuracy.

In paper [7], by Vishakha Lahu Bansod author represents a system for detection and classification of Rice crop disease based on Image of infected rice plant. In this Article various techniques used in Image Processing operation for feature extraction and segmentation of disease. They used the SVM Algorithm on infected leaves which detects color, shape, size and texture.

In paper [8], by Subhajit Maity, Sujan Sarkar, Avinaba Tapadar, Ayan Dutta, Sanket Biswas, Sayon Nayek, Pritam Saha have implemented K-Mean Clustering. In this paper, the leaf is categorized by texture, color, size and infected area by using image processing Technique. After the segmentation and clustering, the author gets the output as disease name and accuracy is represented in Histogram.

In paper [9], by S.S.Saranya, Nalluri Chandra Kiran, Komma Jyotheeswar Reddy they proposed a project which increases the growth of farming outputs, their system is using image processing method (SVM) for detecting affected leaves and identifying using edge detection, texture, diseases spots compared with combined Healthy and Unhealthy leaves dataset and it gives the result as Disease name.

In paper [10], by Xihai Zhang, Yue Qiao, Fanfeng Meng, Chengguo Fan, and Mingming Zhang implemented maize leaf diseases detection using improved CNN. They also mentioned other classification techniques like SVM etc. They worked on 9 types of maize leaves and for more accuracy they improved deep Convolutional Neural Networks models. Using CNN models, GoogleNet and Cifar10 systems generated high identification accuracy up to 98.9% and 98.8% respectively. This survey shows that it is possible to improve recognition accuracy by increasing the diversity of pooling operations.

In paper [11], by Shalini K J, Hema M D, Kavya J, Meghana B N, Jeevitha M C worked on the three-basic reason of disease that are bacteria, fungal and viral. They also tried to increase the accuracy, speed of disease detection, and disease classification using Raspberry pi 3 model B modules, so that the system can send the information to the farmer as soon as possible by GSM module to their cell phones.

In paper [12], by Saradhambal. G, Dhivya R. Latha S, R. Rajesh implemented an inventive idea to identify the affected crop and give remedial measures to agricultural fields. They used the K-Mean Clustering algorithm for analysis and segmentation of infected leaves.

In paper [13], by T. Thamil Azhagi1, K. Swethal, M. Shravani and A.T. Madhavi implemented a system having a Raspberry Pi module using Image processing to detect the disease. The picture of the leaf is captured through a high megapixel camera module, the captured picture is analyzed in Raspberry Pi zero board using Image processing techniques, which displays the picture of the infected leaf, name of the disease and the preventive measure of it.

In paper [15], by Vijai Singh and A. K.Misra presented a survey on different classification techniques like SVM, CNN, K-Mean clustering used for detection of plant leaf disease and different algorithms for Image Segmentation of Leaf diseases images that can automatically detect and classify. They tested their algorithm on Banana, Beans, Lemon, Rose jackfruit, etc. Their project helps farmers to detect the disease in the early stages.

**CONCLUSION**

In this paper we have Survey Various Techniques to identify the leaf diseases. In various papers Image Segmentation technique was adapted to classify a healthy and disease region leaf. In various Paper K-Mean clustering, CNN, SVM these algorithms were used for segmentation of the faulty region in leaves which is more accurate than the existing methods. to identify leaf disease will help farmers at an early stage so that farmer can take preventive action which will ultimately help to increase in Quality and Quantity of products.

**REFERENCE**

1. Kaushik N, Nikhil K G, Sulagna Sarkar, “Plant Leaf Disease Detection and Soil Condition Monitoring System Using CNN and IOT” Journal Of Xi'an University Of Architecture & Technology, Volume Xii, Issue Vi, Issn No: 1006-7930 ,2020.
2. Faye Mohameth, Chen Bingcai, Kane Amath Sada, “Plant Disease Detection with Deep Learning and Feature Extraction Using Plant Village”, Journal Of Computer And Communications, Doi: 10.4236/JCC. 2020.86002 Jun. 17, 2020.
3. Mr. Ashish Nage, Prof. V. R. Raut, “Detection and Identification Of Plant Leaf Diseases Based On Python”, International Journal Of Engineering Research & Technology (IJERT)Issn: 2278-0181 IJERT 050180 Vol. 8 Issue 05, May-2019.
4. Shantanu Kumbhar, Amita Nilawar, Shruti Patil, “Farmer Buddy-Web Based Cotton Leaf Disease Detection Using Cnn”, International Journal Of Applied Engineering Research Issn 0973-4562 Volume 14, Pp. 2662-2666 ,2019
5. Abirami Devaraj, Karunya Rathan, Sarvepalli Jaahnavi And K Indira, “Identification of Plant Disease Using Image Processing Technique” International Conference on Communication and Signal Processing, India, 978-1-5386-7595-3/1 April 4- 6, 2019.
6. Peng Jiang, Yuehan Chen, Bin Liu Dongjian He, And Chunquan Liang, “Real-Time Detection Of Apple Leaf Diseases Using Deep Learning Approach Based On Improved Convolutional Neural Networks”, IEEE, Volume 7, 2019.
7. Vishakha Lahu Bansod, “Rice Crop Disease Identification and Classifier”, International Journal of Computer Sciences And Engineering, Vol.-7, Special Issue-11, May 2019.
8. Subhajit Maity, Sujan Sarkar, Avinaba Tapadar, Ayan Dutta, Sanket Biswas, Sayon Nayek, Pritam Saha, “Fault Area Detection in Leaf Diseases using k-means Clustering”, Jalpaiguri Government Engineering College INDIA.
9. S.S. Saranya, Nalluri Chandra Kiran, Komma Jyotheeswar Reddy, “Identification Of Diseases In Plant Parts Using Image Processing”, International Journal Of Engineering & Technology, 7 (2.8) 461-463, 2018.
10. Xihai Zhang (Member, IEEE), Yue Qiao , Fanfeng Meng, Chengguo Fan , And Mingming Zhang, “Identification Of Maize Leaf Diseases Using Improved Deep Convolutional Neural Networks” ,IEEE Volume 6, 2018.
11. Shalini K J, Hema M D, Kavya J, Meghana B N , Jeevitha M C ,“Leaf Disease Detection By Using Image Processing”, IJIRSET, Vol. 7, Issue 5, May 2018.
12. Saradhambal .G, Dhivya .R , Latha.S, R. Rajesh, “Plant Disease Detection And Its Solution Using Image Classification”, International Journal Of Pure And Applied Mathematics Volume 119 No. 14 , 879-884 ,2018.
13. T. Thamil Azhagi1, K. Swethl, M. Shravani1 & A.T. Madhavi, “Plant Pathology Detection and Control Using Raspberry Pi”, IJESRT, ISSN: 2277-9655, 2018.
14. Prof. Swati Pawar Ms.Shweta Patil Ms .Tejaswini Patil Mr. Nasruddin Shaikh,” Detection And Classification Of Unhealthy Regions Of Grapes Plant Using Texture”, IJSRD, T Vol. 5, Issue 04, 2017.
15. Vijai Singh, A. K. Misra, “Detection of Plant Leaf Diseases Using Image Segmentation And Soft Computing Techniques”, Information Processing In Agriculture 4, 41–49, 2017.
16. Priyanka G. Shinde, Ajay K. Shinde, Ajinkya A. Shinde, Borate S. P, “Plant Disease Detection Using Raspberry Pi By K-Means Clustering Algorithm”, IJEECS, ISSN: 2347-2820, Volume -5, Issue-1, 2017.
17. K. Narsimha Reddy, B.Polaiah, N.Madhu, “A Literature Survey: Plant Leaf Diseases detection Using Image Processing Techniques”, (IOSR-JECE) E-ISSN: 2278-2834, P- ISSN: 2278-8735.Volume 12, Issue 3, VER. II, PP 13-15, 2017.
18. S.S. Lomte, A.P. Janwale, “Plant Leaves Image Segmentation Techniques: A Review”, International Journal Of Computer Sciences And Engineering Vol. 5 (5), E-ISSN: 2347-2693,2017.
19. Ajay K. Shinde,Priyanka G. Shinde, Ajinkya A. Shinde, “Plant Disease Detection Using Raspberry Pi By K-Means Clustering Algorithm” 2016.
20. Khushal Khairnar, Rahul Dagade, “Disease Detection and Diagnosis on Plant Using Image Processing”, International Journal of Computer Applications (0975 – 8887) Volume 108 – No. 13, December 2014.