International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

Identification of Different Plant Leaf Diseases Detection

Ms.M.ANITHA[1], Ms.K.PAVANI [2], Ms. M.Padma Sobhitha Vasumathi [3]
#1 Assistant professor in the Master of Computer Applications in the SRK Institute of Technology, Enikepadu, Vijayawada, NTR District
#2 Assistant professor in the Master of Computer Applications SRK Institute of Technology, Enikepadu, Vijayawada, NTR District
#3 MCA student in the Master of Computer Applications at SRK Institute of Technology, Enikepadu, Vijayawada, NTR District

ABSTRACT:
The agricultural sector is crucial to a nation's overall Economy. Trees are crucial to humanity's survival because they provide food and other necessities. Many farms in the world's poorest nations still rely on time-honored physical labor. The state and national economy can take a hit if plant illnesses aren't discovered in time to prevent economic damages for farmers. Background irregularities during picture capture, segmentation, and categorization pose difficulties in illness detection and classification. It is only possible to implement measures of control after an illness has been properly diagnosed based on the signs and traits of that disease. This study provides in-depth talks on the nature of plant illnesses, how to identify and categorize plant diseases, and the role that machine learning and deep learning play in this process. Based on the results of the poll, it seems that despite their popularity, machine learning techniques have not yet achieved widespread usage. For illness detection and categorization, deep learning approaches have proven more effective than conventional ones.

Keywords: Data Analysis, Classification Deep Learning, Disease Detection,

I. INTRODUCTION

A nation's agricultural sector is its economic bedrock. Though many farmers would like to switch to more contemporary farming methods, they often are unable to because of factors such as a dearth of knowledge about the most recent advancements in the field, the high cost of the necessary equipment, etc. [7]. Many image processing apps have seen improved efficiency in recent years thanks to the use of machine learning based methods [43]. The results of AI-based learning apps have proven fruitful. Methods of machine learning [8] teach the computer to learn naturally and better its performance based on its own observations. It has been noted on numerous occasions that the number of plant illnesses varies according to climatic state, making them challenging to manage. Plants are subject to a wide variety of pathogens, including those of the fungus, bacterial, viral, and parasitic varieties. The prevalence of fungal-like creatures on plants has been estimated at 85% [52]. Traditional methods, which farmers in poor countries still use despite their increased labor and time costs, are generally inferior. It's also conceivable that using your own two eyes won't yield any useful results when it comes to unaided identification. It has likewise been noticed that many ranches use

International Journal For Advanced Research In Science & Technology
A peer reviewed international journal www.ijarst.in
IJARST
ISSN: 2457-0362

herbicides to neutralize the impacts of illness without first recognizing the particular illnesses at play, a practice that poses risks to both the quality of the crops and the people who eat them. Farmers can benefit from machine learning and deep learning for illness detection and categorization in plants so they can take preventative measures. The use of machine learning and deep learning to identify plant illnesses is more efficient and precise than using conventional picture processing methods. Scholars in the field of plant disease face significant challenges, including a lack of data sets for individual diseases, background noise in recorded pictures, low resolution images, and variations in the material property of plant leaves brought on by environmental shifts.

II. PLANT DISEASES AND ITS SYMPTOMS

The following is some fundamental data about microbial pathogens (bacteria, viruses, fungi).

Bacterial diseases: Overgrowths, leaf blotches, scabs, and cankers are just a few of the signs caused by bacterial illnesses. The signs and symptoms of a bacterial illness are very similar to those of a fungus infection. In the case of bacterial illness, leaf blotch is the most typical sign.[60].

Viral diseases: Isolating and analyzing the cause of a virus illness can be a challenging task. Mosaic leaf design, crinkled foliage, yellow leaves, and plant wilting are all signs of a virus illness. Diseases caused by viruses include tobacco mosaic virus, tomato spotted virus, potato virus, cauliflower mosaic virus, and many others.[20].

Fungal diseases: Diseases like these are prevalent on many different types of veggies. Plants can suffer significant losses due to fungal illnesses. Anthracnose, downy mildews, powdery mildews, rusts, rhizoctonia rots, sclerotinia rots, and sclerotium rots are all significant fungus illnesses.[50].

Bacterial diseases **Fig. 1.** Viral diseases **Fig. 2.** Fungal diseases **Fig. 3.**

Traditional Methods of Disease Detection Classifying and identifying plant diseases is a process that relies heavily on digital image processing and machine learning. Catching an image, taking out clamor, portioning a picture, and physically removing highlights are instances of picture handling; include choice and order are instances of AI. Based on the characteristics of the images, machine learning algorithms are used to classify the illnesses. [47].

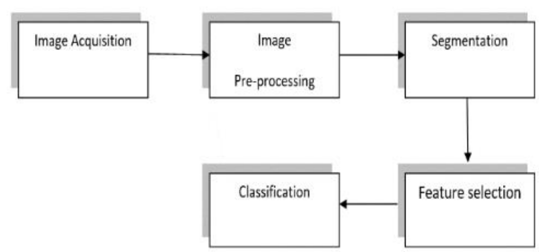


Fig. 4. Approach for diseases detection and classification.

The above diagram depicts the standard procedure for diagnosing plant illnesses and categorizing them. Image pre-processing includes tasks like picture filtration, noise elimination, scaling, and so on; this is just one example of the many sub-steps that make up the overall method. In the same vein, various techniques, such as edge recognition (Sobel, Canny, etc.), k-means clustering, otsu thresholding, etc., can be used to carry out picture segmentation. Histogram of directed gradients, Faster Robust Features, Color and Texture Features, Local Binary Patterns (LBP), etc., can all be used for feature extraction, while NB Classifier, Nearest Neighbor, SVM, DT, Boosted Trees, RF, NN, Logistic Regression, etc., can all be used for classification.[29].

Difference between Machine Learning and Deep Learning

While both Profound Learning and customary machine learning use information, the way that data is presented to the system is where the two diverge significantly. Deep learning in machine learning models and methods for organized data, where the number of ANN layers makes a difference. While traditional machine learning approaches to plant disease identification and categorization rely heavily on human-executed feature extraction, deep learning takes care of this step autonomously.[36].

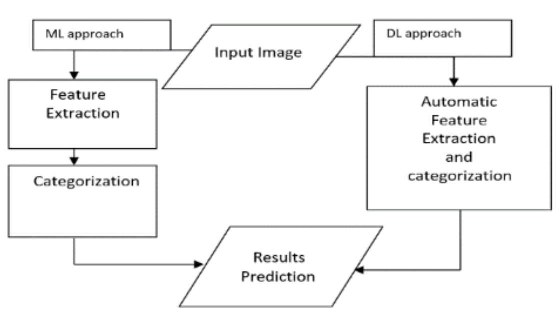


Fig. 5. shows two different approaches for disease detection and classification.

III.LITERATURE SURVEY OF DISASES PREDICTION

[In India, farmers grow a huge range of crops, and the problem of environmentally friendly plant disease safety is closely related to the problems of sustainable agriculture and local weather change. Different pathogens are present in the environment, which negatively impacts the vegetation and soil in which the plant is planted, affecting the production of plants. Different diseases are present on the plant life and vegetation. The leaves of the affected plant or crop are crucial for identifying it. The leaf's numerous coloured dots and patterns are highly helpful in spotting the condition. The prior situation for detecting plant disorders involved direct eye inspection, keeping in mind the specific set of disorders depending on the climate, season, etc. These methods have taken a lot of time and have undoubtedly been wrong. Modern methods of plant disease identification involved a number of laboratory tests, qualified individuals, appropriately equipped facilities, etc. These items are no longer useful everywhere, especially in remote areas. The use of an automated system for disease detection is advantageous since it lowers the need for labor-intensive manual inspection of big crop farms and recognises probable disease symptoms as soon as they develop on plant leaves.

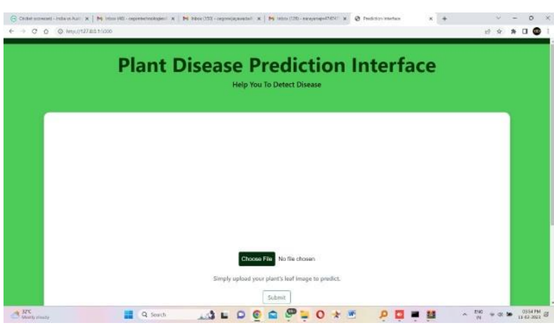
Different processes to identification and quantification of factory sickness are in exercise and splint image- grounded identification of factory sickness is one of them(11- 17). It's by way of a ways the stylish way to mechanically come apprehensive of factory sickness and can be used for identification of quite a number ails(12). The prevalence of factory complaint reasons precise variations in the texture and shade of the splint and accordingly splint imagery can be used to prize shade and texturebased rudiments to instruct a classifier. Some of the full- size literature in the area of factory splint-grounded sickness identification is furnished below.

There are two tactics for splint picture primarily grounded factory sickness identification(i) deep gaining knowledge of grounded, which use complicated infrastructures to routinely examine angles(ii) point- grounded, which prize home made angles similar as shade and texture angles to educate a traditional laptop gaining knowledge of algorithm. The deep mastering primarily grounded ways has supplied lesser rigor still they bear lesser calculation and accordingly now not applicable for cellular or handheld widgets with confined reminiscence and calculations. Some of the designed structures are concentrated one- of-a-kind ails of some unique factory, whereas the different procedures thing a couple of factory conditions. Phadikar etal.(18) has introduced a function primarily grounded strategy to disease identification of rice factory. They've used Fermi strength primarily grounded fashion for segmentation observed by way of color, figure and position mapping. Rough set principle is used for determination of essential angles and rule mining with10-foldcross-validation is used for contrivance testing. Baquero etal.(19) has introduced a Content-Grounded Image Retrieval(CBIR) device which makes use of achromatism shape descriptors and nearest neighbors to classify vital affections or sickness signs and symptoms similar as chlorosis, sooty molds and early scar. also, Patil etal.(20) has also introduced a CBIR and uprooted color, structure and texture grounded completely features. Sandika etal.(21) has proposed a point- grounded strategy for disease identification of grapes leaves. They've also carried out the evaluation of texture point's performance. of Their Oberti etal.(22) has concentrated the fungal disease of conduit factory(fine mildew) due to its dangerous issues on the crop yield and great of yield. They've usedmulti-spectral imaging and captured connections splint filmland at a vary of angles(0 to seventy five degrees). They've also stressed that the discovery perceptivity will increase with the expand in perspective and veritably stylish figure is bought at 60 categories and for early center a long time the perceptivity improves from 9- 75 with trade in perspective from 0- 60 degrees. also, Zhang etal.(15) has introduced a point- grounded strategy which radically change the print into superpixel illustration and also section the favored place the operation of k- means and excerpt aggregate of histogram of exposure grade(PHOG). Sharif etal.(23) has introduced a point- grounded system for citrus fruit factory complaint. They've used a mongrel characteristic decision system grounded completely on abecedarian factor evaluation and function statistics. Singh etal.(24) has

International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
IJARST
ISSN: 2457-0362

also introduced a function primarily grounded system for pine trees. Bai etal.(25) has centered cucumber factory sickness and proposed an accelerated fuzzy c- mean primarily grounded clustering system to section the diseased splint area. Hlaing etal. has introduced a function primarily grounded strategy and used PlantVillage dataset. The have uprooted SIFT points and employed generalized pareto distributions to calculate viscosity function. Support vector machines is used to educate on these points and furnished a10-foldcross-validation delicacy of84.7.

IV. OUTPUT RESULTS



V. CONCLUSION

In this research, we analysed the strengths and weaknesses of traditional techniques, machine learning, and deep learning when it comes to classifying plant illnesses and making diagnoses. We talked about four key steps—Image Pre-processing, Segmentation, Feature selection, and Classification—in the process of detecting and categorising illnesses. K-means for segmentation, support vector machines, and artificial neural networks are the most effective methods for detecting and classifying sick plants, as evidenced by the aforementioned review. Comparing CNN's performance to that of more conventional machine detection and categorization methods for plant illnesses, the results are clear from a review of the literature on deep learning. It is evident that, when comparing all of the various learning techniques, deep learning is by far the most

International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

effective. Some of the dataset was recorded under ideal conditions, which means there was no background noise. If noise is introduced to the image, the algorithm's effectiveness could suffer. After looking at a large number of papers, one significant shortcoming was identified: many researchers created their own dataset, which isn't available to different specialists. Thus, new calculation improvement from different specialists can't assess the dataset, which isn't straightforwardly accessible. The next step is to implement a programmed that will aid farmers in illness detection and classification in hardware.

VI .DISCUSSION AND FUTURE SCOPE

In this lesson, we covered the fundamentals of plant illnesses, as well as numerous methods for identifying and categorising them. There are a plethora of different plant-related illnesses that need to be dealt with. Bacterial, virus, and fungus infections are the three major types of illnesses that affect humans. The structure of various illnesses is depicted in Figures 1, 2, and 3. Scientists face many challenges when trying to study plant illnesses; in this overview, we present the conventional approach, which relies on already-developed image processing methods (as depicted in Fig. 4). Figure 1 compares the results of various researchers in order to demonstrate how machine learning can be used to identify and categorize illness. The precision of various picture segmentation, feature extraction, and categorization techniques are compared and contrasted in Table 2. Each researcher's suggested path forward for the field is outlined in Table 1. Researcher created Kaggle, Plant Village, and their own dataset, as shown in Table 1. It is clear from Table 2 that k-means segmentation and Hue Based segmentation were the most popular methods for researchers to use when attempting to segment data, while various machine learning classification algorithms such as SVM, ANN, Decision Tree Classifier, Random Forest, Decision tree, Naive bayes, PNN, and BPNN were used when attempting to classify the data. Figure 2 shows that the SVM and NN are the most popular categorization algorithms because they achieve the highest levels of precision. The four methods for diagnosing plant illnesses are depicted in Fig. 6. The various hue codes represent the various possible combinations. Figure 3 displays a summary of the different deep learning approaches. The study's author conducted tests on tomato, corn, apple, and other products to generate the plant community collection, which includes thousands of pictures. The models used to achieve precision are listed in Table 3, and they include GoogleNet, Cifar10, Mutichannel CNN, R-CNN, and CNN (CaffeNet). Controversy arising from competing interests. Interests are not in competition. In regards to the release of this article.

VII. REFERENCES

[1]. Al-bayati, J. S. H., & Üstündağ, B. B. (2020). Evolutionary Feature Optimization for Plant Leaf Disease Detection by Deep Neural Networks. International Journal of Computational Intelligence Systems, 13(1), 12-23.

[2]. Arsenovic, M., Karanovic, M., Sladojevic, S., Anderla, A., & Stefanovic, D. (2019). Solving current limitations of deep learning based approaches for plant disease detection. Symmetry, 11(7), 939.

[3]. Anand, R., Veni, S., &Aravinth, J. (2016). An application of image processing techniques for detection of diseases on brinjal leaves using k-means clustering method. In 2016 international conference on recent trends in information technology (ICRTIT) (pp. 1-6). IEEE.

[4]. Abdullah, N. E., Hashim, H., Yusof, Y. W. M.,Osman, F. N., Kusim, A. S., & Adam, M. S. (2012, September). A characterization of watermelon leaf diseases using Fuzzy Logic. In 2012 IEEE Symposium on Business, Engineering and Industrial Applications (pp. 1-6). IEEE.

[5]. Alias, N., Nashat, S., Zakaria, L., Najimudin, N., & Abdullah, M. Z. (2011, November). Classification gel electrophoretic image of DNA Fusarium graminearum featuring support vector machine. In 2011 IEEE International Conference on Signal and Image Processing Applications (ICSIPA) (pp. 109-114). IEEE. [6]. Al Bashish, D., Braik, M., &Bani-Ahmad, S. (2010, December). A framework for detection and classification of plant leaf and stem diseases. In 2010 international conference on signal and image processing (pp. 113- 118). IEEE.

[7]. Balakrishna, K., & Rao, M. (2019). Tomato plant leaves disease classification using KNN and PNN. International Journal of Computer Vision and Image Processing (IJCVIP), 9(1), 51-63.

[8]. Bajpai, G., Gupta, A., & Chauhan, N. (2019, July). Real Time Implementation of Convolutional Neural Network to Detect Plant Diseases Using Internet of Things. In International Symposium on VLSI Design and Test (pp. 510-522). Springer, Singapore.

[9]. Barbedo, J. G. A. (2013). Digital image processing techniques for detecting, quantifying and classifying plant diseases. SpringerPlus, 2(1), 660.

[10]. Buades, A., Le, T. M., Morel, J. M., & Vese, L. A. (2010). Fast cartoon+ texture image filters. IEEE Transactions on Image Processing, 19(8), 1978-1986.

AUTHOR PROFILES

Ms.M.ANITHA completed her Master of Computer Applications and Masters of Technology. Currently working as an Assistant professor in the Department of Masters of Computer Applications in the SRK Institute of Technology, Enikepadu, Vijayawada, NTR District. Her area of interest includes Machine Learning with Python and DBMS.

Ms.K.PAVANI completed her Master of Computer Applications. Currently working as an Assistant professor in the department of MCA at SRK Institute of Technology, Enikepadu, NTR District. His areas of interest include Artificial Intelligence and Machine Learning.

Ms. M.Padma Sobhitha Vasumathi is an MCA student in the Department of Computer Applications at SRK Institute of Technology, Enikepadu, Vijayawada, NTR District. She had a Completed Degree in B.Sc.(computers) from Ch.S.D.St.Theresa's College for women(Autonomous) Eluru. Her areas of interest are DBMS, and Machine Learning with Python.