e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:03/March-2023 Impact Factor- 7.868 www.irjmets.com

CROPS LEAF DISEASE DETECTION

Ankul Chaudhary[*1], Mandal Satish Kanoo[*2], Naveen Singh[*3], Nilesh Kumar Gupta[*4]

[*1,2,3,4]Department Of Computer Science & Engineering Greater Noida Institute Of Technology, Greater Noida, U.P., India.

DOI : https://www.doi.org/10.56726/IRJMETS34513

ABSTRACT

Agriculture has a hugely important role in people's lives. Almost 60% of people work in agriculture, either directly or indirectly. Because there are no technologies in the outdated system to diagnose diseases in various crops in an agricultural context, farmers are not interested in increasing their agricultural production day by day. Since agricultural diseases have an impact on the growth of their specific species, early detection is crucial. Agricultural illnesses have been identified and categorized using a variety of Machine Learning (ML) models, but recent advancements in a subset of ML called Deep Learning (DL) appear to offer tremendous promise for improved accuracy in this area of research. The recommended technique uses a deep neural network and a convolutional neural network to precisely and successfully identify the signs of crop disease. These solutions are additionally assessed utilizing a range of efficiency metrics. This page provides a detailed explanation of the DL models that are used to visualize agricultural diseases. There are also a few gaps in the literature that can help us understand how to recognize plant illnesses even before symptoms show up. A convolution neural network-based method for detecting plant leaf disease will be developed using the suggested strategy.

Plant diseases significantly lower agricultural production and economic output while also reducing the quality and quantity of agricultural products. In the monitoring of enormous fields of crops, plant disease detection is now getting more attention. It can be difficult for a farmer to switch from one disease management method to another. Expert observation with the unaided eye is the classic technique employed in practice for discovering and identifying plant diseases. Utilizing efficient management strategies can be made simpler by early disease identification and crop health information. The pros and disadvantages of these different strategies are also contrasted in this essay. Picture acquisition, image pre-processing, feature extraction, and neural network-based categorization are just a few of the processes involved.

I. INTRODUCTION

India is a rapidly industrializing nation whose early development was mostly fueled by agriculture. Agriculture is having a hard time keeping up with demand since the world's population is growing swiftly. It's also essential to convey to the next generation the importance of horticulture. A multitude of problems, such as climate change, pollinator decline, agricultural pests, insufficient irrigation, and others, continue to pose a threat to global food security. Food output is reduced by crop disease in terms of both quantity and quality. Crop diseases negatively affect both the world's food security as well as small-scale farmers whose livelihoods depend on safe farming.

The advantage is that crop diseases can be identified by spotting them when they manifest on harvests. Giving a convincing solution to this problem has been made possible by the way the web and computer vision have been approached. A misdiagnosis of plant disease causes a significant loss in production, resources, time, and product quality. Understanding the state of the plant is essential for healthy development. Crops are significantly impacted by a variety of environmental anomalies, including organisms, water shortages, bugs, and weeds. These are the kinds of problems that call for farmers to take precautions to increase productivity.

These kinds of problems necessitate that farmers take preventative measures to improve efficiency. Focusing on yield's outwardly designated nature is supported by this investigation. The development of counterfeit knowledge has made it possible to differentiate plant diseases from crude images. A learning framework called deep learning is based on the neural network in the human brain. The ability of deep learning to naturally distinguish highlights from photographs is one of its advantages. The neural network learns how to remove

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:03/March-2023 Impact Factor- 7.868 www.irjmets.com

highlights during arrangement. CNN, a multi-facet feed-forward brain network, is the most widely used Deep learning model.

II. LITERATURE SURVEY

DEFINITION OF THE PROBLEM: Agriculture is a fundamental and important part of the Indian economy. India's agribusiness sector employs nearly 50% of the country's workforce. India is the world's largest producer of legumes, rice, wheat, spices and seasonings. The economic stability and growth of farmers depends only on the quantity and quality of crop growth and land yields. Subsequently, the detection and identification of plant diseases is important in the agricultural industry. Plants are highly susceptible to infections that inhibit plant improvement and affect farmer ecosystems. The use of automated infection detection systems can help detect plant diseases at an early stage. Plant diseases can appear on different parts of the plant, such as the leaves. Physical analysis of plant infection from leaf photographs requires a long investment. Therefore, there is a need to develop computational strategies to mechanize the process of disease identification and assembly using leaf images.

THEORETICAL BACKGROUND OF THE PROBLEM: The yield of fields sown by farmers depends on the quantity and quality of the yield. Field yields are greatly affected by a variety of diseases that affect both yield quality and quality. Leaf disease detection systems can be used to stop these problems early.

TRADITIONAL METHODS TO SOLVE THE PROBLEM: The current approach for detecting plant diseases is simple macroscopic observation by plant specialists, which can be used to detect and identify plant diseases. Under such circumstances, the proposed technique for tracking extended crops is useful. Moreover, in some countries farmers do not have adequate equipment or do not know to consult experts. This means that expert advice is not only more expensive, but also takes more time. Increase.

III. METHODOLOGY/WORK PLAN

This study focuses on the identification of plant diseases. Segmentation, feature extraction, and classification techniques are used to detect plant diseases. A digital camera or similar device is used to take pictures of the leaves of various plants and the images are used to classify the affected areas of the leaves. To detect plant diseases, we use convolutional neural networks and deep neural networks in the proposed framework. In this paper, we propose a framework that uses low-cost open-source software to accomplish the task of reliably detecting plant diseases.

List of modules:

- Image Acquisition.
- Image preprocessing.
- Image Enhancement.
- Image segmentation.
- Image Analysis
- Feature Extraction.
- Disease Classification.

1. Image collection: The first step is to collect data from publicly accessible repositories. The image serves as input for further processing. We chose the most common image domains so that any format can be accepted as input to the method, including BMP, JPG, and GIF. The camera feeds real-time images directly. Most leaves vary in color from red to green for accurate segmentation, thus providing a white background for further study, good visibility and easy image analysis. Images of cotton are captured in this process using an image capture system. Images are captured to avoid distortion. Photos were not taken in direct sunlight as the image will be distorted.

2 Image Preprocessing: Imaging a digital image using a computer algorithm is called image preprocessing. Plants can be recognized by analyzing images using specific algorithms. It uses a similar approach for image processing and recognition using specific algorithms. Image quality is important in this process. The algorithm cannot be used if the image is not sharp.

3 Image Enhancement: The process of modifying a digital image to make its effects more suitable for display or further image processing is called image enhancement. You can use the following to enhance your image:

- Histogram equalization.
- Filter noise reduction.
- Unsharp mask filtering.
- decorrelation stretching, etc.

4. Image segmentation: Image segmentation is a method of dividing a digital image into a number of segments (sets of pixels, also called image objects). Image segmentation is used to simplify image identification and analysis by dividing an image into multiple segments and analyzing each segment separately. Color, texture, and intensity are all common characteristics of the various segments.

5. Image Analysis: This step uses image segmentation to identify regions of interest. The technique used in segmentation is region-based segmentation, which uses leaf color to distinguish between healthy and diseased areas of plant leaves.

6. Feature Extraction: Feature extraction is part of the dimensionality reduction method in machine learning that divides and reduces large collections of raw data into smaller classes. This step is very important if you have a lot of data and want to minimize the number of resources while avoiding errors. Therefore, function extraction helps extract optimal features from large data sets by selecting variables and combining them into functions.

7 Disease Classification: This is a method for detecting plant diseases using certified deep learning models. A digital camera or equivalent system should be used to capture images of contaminated plant leaves. I used OpenCV to scan the image. Then determine what kind of plant it is. After the plant is found, determine what disease the plant is suffering from.

IV. ADVANTAGES/DISADVANTAGE OF THOSE METHODS

Advantages

The traditional method is easy to use and easy to understand for the farmers. They rely on the experience they get during the agriculture in their lifetime that can be very helpful than any other deep learning model. The solution of the problem can also be easily found out if it is a common disease and it is also a fast method then using any other electronic device to use the browser to access the website which is a great problem for most of the farmers who are not used to the android devices.

Disadvantages

- Only humans are capable of predicting diseases.
- The procedure is extremely slow.
- Consumption of time and space is also very high.
- The price is also high

OUR SOLUTION TO SOLVE THIS PROBLEM: We will implement the system using different machine learning models. There will be different deep learning models for the different crops that are trained on the large amount of the dataset so that the most general diseases can easily be find out. We will train the systems using 75% of data and then test our model to check which systems yields better output using the remaining 25% of historic data.

WHY OUR SOLUTION IS DIFFERENT FROM OTHERS?

Our solution uses a different models and different technique to perform the prediction. We are using the particular model to detect and predict the disease based on the image of the crops leaves.

WHY OUR SOLUTION IS BETTER?

To detect plant disease, we use a Convolution neural network and a Deep neural network in the proposed framework. This paper proposes a framework that employs low-cost, open-source software to achieve the task of reliably detecting plant disease.

V. CONCLUSION

The proposed system regularly tracks cultivated fields. CNN and DNN algorithms are used for early detection of plant diseases. It uses machine learning techniques to train models and help make better disease decisions. Farmers are encouraged to use pesticides to contain infectious diseases. In the future, the proposed system

could be expanded to provide additional facilities such as nearby government markets, pesticide price lists, and nearby public markets.

This paper provides an overview of different disease classification strategies for detecting plant diseases and an image segmentation algorithm that can be used in the future for automatic detection and classification of plant leaf diseases. The best results were obtained with a small amount of computation, demonstrating the effectiveness of the proposed algorithm in plant disease detection and classification. Another advantage of this approach is the early or early detection of plant diseases. Convolutional neural networks and deep neural network algorithms can be used to increase detection rates in the classification process.

VI. REFERENCES

[1] Gaurav Verma, Charu Taluja, Abhishek Kumar Saxena "Vision Based Detection and Classification of Disease on Rice Crops Using Convolutional Neural Network" ,2019

[2] Nikhil Shah1, Sarika Jain2 "Detection of Disease in Cotton Leaf using Artificial Neural Network",2019

[3] Ch. Usha Kumari "Leaf Disease Detection: Feature Extraction with K-means clustering and Classification with ANN",2019

[4] Melike Sardogan, Adem Tuncer, YunusOzen "Plant Leaf Disease Detection and Classification Based on CNN with LVQ Algorithm", 2020

[5] H. Al-Hiary, S. Bani-Ahmad, M. Reyalat, M. Braik and Z. ALRahamneh "Fast and Accurate Detection and Classification of Plant Diseases", 2011

[6] André S. Abade, Paulo Afonso Ferreira and Flávio de Barros Vidal "Plant diseases recognition on images using convolutional neural networks: a systematic review" ,2020

[7] Guo, X., Zhang, M., & Dai, Y.," Image of Plant Disease Segmentation Model Based on Pulse Coupled Neural Network with Shuffle Frog Leap Algorithm.",2018.

[8] Chouhan, S. S., Kaul, A., & Singh, "A deep learning approach for the classification of diseased plant leaf images.",2019.

[9] Kumar, M., Gupta, P., Madhav, P., & Sachin, "Disease Detection in Coffee Plants Using Convolutional Neural Network",2020

[10] Francis, J., AntoSahaya Dhas D, & Anoop B K.," Identification of leaf diseases in pepper plants using soft computing techniques.",2016

[11] Ganesan, P., Sajiv, G., & Leo, L. M." CIELuvcolor space for identification and segmentation of disease affected plant leaves using fuzzy based approach.",2017.