



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 4, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

Disease Detection and Quality Analysis of Arecanut

Prof. Deeksha K R¹, Mr. Rakshith², Ms. Chaithra³, Ms. P Megha Rao⁴, Ms. Sameeksha Jain⁵

Professor, Dept. of ISE, YIT Moodbidri, Mangalore, Karnataka, India¹

B.E Student, Dept. of ISE, YIT Moodbidri, Mangalore, Karnataka, India^{2,3,4,5}

ABSTRACT: The economy depends significantly on agriculture in developing nations like India. Arecanut, also referred to as betel nut, is a tropical crop. The world's second-largest producer and consumer of arecanuts is India. It experiences a range of diseases from the root to the fruit during its whole life cycle. The current method for detecting arecanut diseases is simply observation with the naked eye and farmers must periodically examine each crop carefully to look for diseases which is a highly difficult and time-consuming task that calls for more manpower and suitably equipped laboratories. This is a very difficult task that takes a lot of time and manpower to complete, and it also necessarily requires the use of expensive equipment, adequately equipped labs, and more staff members. Early disease detection is also not technically feasible. In this study, we proposed a system that, by employing convolutional neural networks, aids in the detection of arecanut diseases and quality issues and offers effective options. Hence, a method for automatically detecting diseases is required.

KEYWORDS: Arecanut, CNN, Color, Disease, Image processing, Quality

I. INTRODUCTION

The arecanut palm (*Areca catechu* L.) is grown largely for its kernel, which is extracted from the fruit and chewed whether it is young, ripe, or processed. Only three countries have commercial agriculture: Sri Lanka, Bangladesh, and India. Nearly 90% of the land and output in our nation is produced in Kerala, Karnataka, and Assam. As compared to global production, India produces the most areca nuts (1.27 tonnes per hectare). An important step in price fixing is areca nut grading. This aids farmers in obtaining the appropriate price for their crop. The colour, shape, and texture of the areca nut are used as characteristics to determine its classification. Based on colour, a system for classifying areca nuts into two groups was suggested. A well-liked optimisation approach for neural network training in machine learning is called Adam (Adaptive Moment Estimation) is used for training the datasets. For ranking, the segmented red and green areca nut areas are employed.

II. RELATED WORK

[1]. Areca Nut Disease Detection using Image Processing Technology:

In this paper, by examining digital photographs of the plant's leaves, image processing technologies can be used to identify the areca nut disease. The algorithms used for image processing can be trained to recognise patterns in images that are suggestive of disease. Discoloration, lesions, or aberrant growth patterns are a few examples of these patterns. The first step in applying image processing technology to identify Areca Nut disease is to take high-resolution digital pictures of the plant's leaves. A digital camera or the camera on a smartphone can be used for this. Many image processing techniques, including filtering, segmentation, feature extraction, and classification, can be used to process the photos after they have been taken. The image processing method can be used to examine new photos and recognise the presence of the disease once it has been trained to recognise the patterns of Areca Nut disease. Farmers may find this technology to be very helpful as it enables early illness detection and treatment, preventing the disease from spreading and seriously harming the crop.

[2]. Detection of Diseases in Arecanut Using Convolutional Neural Networks:

In this research paper, the crop is yet vulnerable to a number of illnesses, which can drastically lower the output and quality of the food. Thus, for efficient disease management and crop protection, early disease diagnosis is essential. A tropical crop called arecanut, also referred to as betel nut, is grown there. India is the world's second-largest producer

and consumer of arecanuts. It has a long life cycle and is afflicted by numerous illnesses, from root to fruit. The only method used to identify diseases at the moment is visual observation, and farmers must periodically examine each crop carefully to look for infections. In this study, we proposed a system that, with the use of convolutional neural networks, aids in identifying arecanut disorders and offers possible treatments. An image is used as the input for a convolutional neural network (CNN), which subsequently assigns learnable weights and biases to distinct objects in the image and learns. Convolutional Neural Networks (CNNs) can face a number of difficulties when used to identify diseases in the Arecanut, including a lack of data, class imbalance, unpredictability in disease symptoms, transferability to other regions, and interpretability.

[3]. A review on Smart Agricultural Applications: Crop yield and Plant disease Prediction:

The agriculture sector could be revolutionised by smart agricultural applications that employ machine learning strategies for crop yield and plant disease prediction. The creation of these tools that can help farmers make data-driven decisions has made tremendous strides in recent years. The way farmers labour and manage their crops has been revolutionised by smart agriculture software. Crop yield and plant disease forecasting are two of these applications that are noteworthy and have received a lot of attention recently. The Internet of Things (IoT) is regarded as a form of large-scale, distributed network made up of numerous, inexpensive, and battery-restricted sensor nodes placed throughout the environment. In conventional networks, sensor nodes regularly gather environmental data and transmit it to the base station or sink node for analysis. IoT has many useful uses in science, but it is particularly useful in agricultural applications, particularly in disease and yield prediction. There are numerous techniques that can be used to facilitate an accurate forecast in agricultural applications, according to the literature. In order to highlight the many flaws of the current approaches for prediction problems related to IoT-agricultural applications, this survey analyses the existing research focusing on prediction difficulties linked with IoT agricultural applications.

[4]. A Literature Review of the Detection and Categorization of various Arecanut Diseases using Image Processing and Machine Learning Approaches:

Several studies have used image processing and machine learning approaches for disease identification and categorization in arecanut crops, according to a survey of the literature on the subject. For instance, researchers utilised a convolutional neural network (CNN) to categorise photos of healthy and diseased arecanut leaves in a study that was published in the Journal of Imaging. When it came to identifying illnesses like leaf spot, leaf blight, and leaf rot, the CNN had a 94% accuracy rate. Arecanuts, the seeds of the areca palm, are found throughout much of the tropical Pacific Ocean, South-East and South-Asian nations, and Eastern Africa region. Detection and categorization of various arecanut diseases using image processing and machine learning approaches can be challenging due to various factors, including complex image analysis, limited research and limited availability of high-quality images. Addressing these challenges will require developing more robust image processing techniques and machine learning models that can handle the variability and complexity of arecanut diseases. Additionally, collecting more high-quality data and conducting more research in this area can help improve the accuracy and effectiveness of these approaches.

[5]. Image Processing based Arecanut Diseases Detection Using CNN Model:

Betel nut, sometimes referred to as arecanut, is a significant cash crop in many regions of the world. Early disease detection and prompt action to stop its spread are two ways to lessen this issue. Convolutional neural networks (CNNs), in particular, have been successfully used in image processing in recent years for the identification and categorization of plant diseases. The use of CNNs for the early identification of arecanut illness is briefly described here.

1. Data gathering and preparation: Gathering a dataset of photos of arecanut leaves that reflect diverse healthy and diseased stages is the initial step in the data gathering and preparation procedure. For the CNN to learn and generalise effectively, the dataset must be sizable and diverse enough. The photos must be preprocessed after the dataset has been gathered in order to eliminate noise, correct brightness and contrast, and shrink them to a standard size.

2. CNN architecture: Construction of a CNN architecture that can distinguish between healthy and sick arecanut leaves is the next phase. Several convolutional layers are often followed by pooling layers, dropout layers, and fully linked layers in the design. The complexity of the issue and the size of the dataset determine the number of layers and their arrangements.

3 Training the CNN: The preprocessed dataset is used to train the CNN. The network modifies the weights of its layers during training to reduce the discrepancy between its anticipated outputs and the actual labels. The network's performance is assessed using a validation dataset after each of the numerous iterations, or epochs, that make up the training process.



4. Testing the CNN: Once taught, the CNN may be used to categorise fresh photos of arecanut leaves as healthy or unhealthy. To do this, an image is fed into the network to get the predicted output. To assess the network's accuracy, the projected result is contrasted with the actual label.

In general, CNNs have demonstrated good outcomes in the identification of plant diseases, particularly illnesses of the arecanut. It is crucial to remember that the network's performance is influenced by the amount and quality of the dataset, the difficulty of the challenge, and the network's architecture. To effectively identify arecanut illness, the CNN must be thoroughly designed and tested.

III. METHODOLOGY

The following steps can be used to outline the methodology for arecanut disease detection and quality analysis utilising image processing and machine learning techniques:

Image acquisition: Acquiring high-resolution photos of the arecanut is the first stage. Digital cameras or mobile devices with high-resolution cameras can be used for this.

Image pre-processing: Pre-processing of the obtained photos improves their quality and gets rid of noise and artefacts. This can involve filtering, normalisation, image augmentation and image scaling.

Disease segmentation: To separate the diseased areas from the healthy areas, the pre-processed pictures are segmented. Several picture segmentation methods are used. Classification of arecanut disease takes place.

Feature extraction: From the segmented pictures, relevant characteristics are retrieved when the diseased areas have been located. These characteristics can include the affected areas' colour, texture, shape, and size.

Training a machine learning model: The extracted features are used to train a neural network among other models. A dataset of identified photos that includes both healthy and ill arecanuts is used to train the model.

Disease detection: After being trained, the machine learning model used to identify diseases in arecanuts by examining the features that were taken from the images.

Quality analysis: Image processing techniques can also be used to assess the quality of arecanut nuts in addition to disease identification. This may involve analysing the nuts' size, shape, colour, and texture to determine their quality.

Decision-making support: The outcomes of the quality assessment and disease detection can be used to assist farmers in making decisions. The outcomes, for instance, might be utilised to choose the best pest control methods and give prescription for the identified disease using Flask framework.

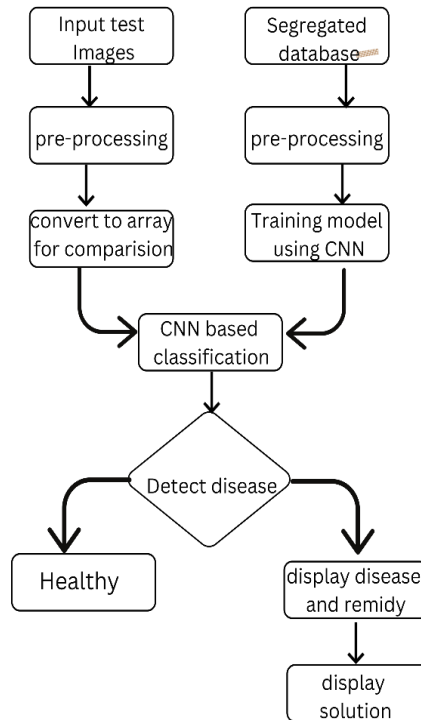
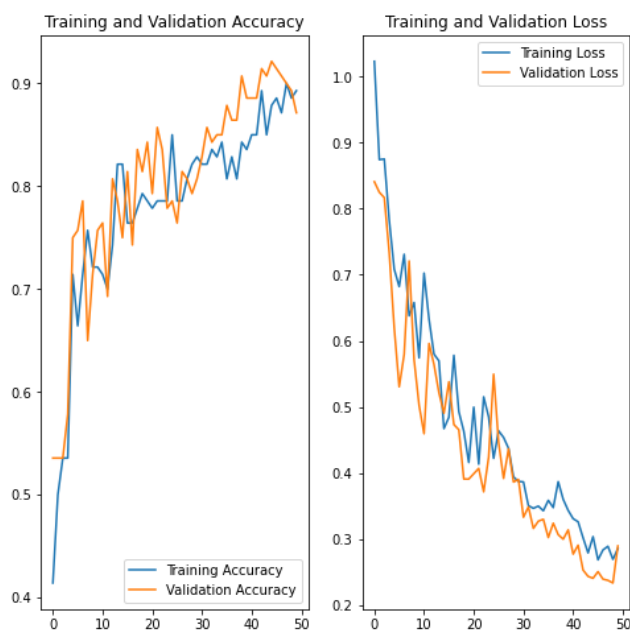


Fig1: Block Diagram of ProposedSystem

IV. EXPERIMENTAL RESULTS





V. CONCLUSION

This study employs convolutional neural networks using the Adam algorithm which combines two distinct concepts to offer an effective and efficient optimisation technique that is both computationally efficient to identify ailments in the arecanut. Preprocessing the input image comes first, then feature extraction, training, and classification. The suggested system gives treatments for arecanut ailments such as Mahali/Koleroga and Split disease. The experimental results demonstrate a range of disease detection accuracy depending on the input image quality and disease stage. The system's total accuracy is predicted to be 94.46%. This approach thus moves in the direction of encouraging farmers to engage in intelligent farming and enabling them to decide on yields more effectively.

REFERENCES

- [1] "Areca Nut Disease Detection using Image Processing Technology", Vol. 9 Issue 08, August-2020 International Journal of Engineering Research & Technology (IJERT) by Dhanuja K C and Mohan Kumar H P. ISSN: 2278-0181
- [2] "Detection of Diseases in Arecanut Using Convolutional Neural Networks", Volume: 08 Issue: 05, May 2021 International Research Journal of Engineering and Technology (IRJET) by Anilkumar M G, Karibasaveshwara TG, Pavan HK, Sainath Urankar and Dr. Abhay Deshpande. e-ISSN: 2395-0056 p-ISSN: 2395-0072
- [3] "A review on Smart Agricultural Applications: Crop yield and Plant disease Prediction", 2022 International Conference on Applied Artificial Intelligence and Computing (ICAAIC) | 978-1-6654-9710-7/22/\$31.00 ©2022 IEEE by Vani B V and Dr. C D Guruprakash. DOI: 10.1109/ICAAIC53929.2022.9792736
- [4] "A Literature Review of the Detection and Categorization of various Arecanut Diseases using Image Processing and Machine Learning Approaches", Vol.5, No. 2, December 2021 International Journal of Applied Engineering and Management Letters (IJAEML) by Puneeth B. R. and Nethravathi P. S. ISSN: 2581-7000.
- [5] "Image Processing based Arecanut Diseases Detection Using CNN Model", Volume 2 Issue 6, June 2022 International Journal of Advanced Research in Science, Communication and Technology (IJARSCT) by MeghanaDR and Prabhudeva S. DOI: 10.48175/IJARSCT-5154



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.423



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

9940 572 462 **6381 907 438** **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details