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Survey Paper “RICE LEAF DISEASE DETECTION USING DEEP LEARNING”

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ABSTRACT: Plant diseases have negative impact on the agricultural sector. This diseases lower the productivity of the yeild and gives huge loss to the farmers. For precision agriculture it is very important to detect diseases in the plants to save agricultural crop yeild and minimising the use of pesticides. Detection of diseases at early stage can be done using Image processing domain. Detection of diseases in rice leaf can be done using Deep Learning and Machine Learning techniques. Convolution Neural Network (CNN) can be used for feature extraction, extracting features for the rice leaf images and finally classification.

KEYWORDS- Rice Leaf Disease Detection, Convolutional Neural Network, Neural Network, Deep Learning

I. INTRODUCTION

Agribusiness is India's main sort of income. 70% of Indian people and around 58% of India's natural people depend upon agribusiness. Among various harvests, rice is the most basic. It gives energy and protein to most of the absolute people. It has been approximated that the quantity of occupants in the world will climb around 8.5 billion of each 2030, 9.7 billion out of 2050 and 10.9 billion out of 2100, independently. The interest and use of rice increases with the extension in the general population. To address out this trouble, it is surveyed and expected that rice creation is to be extended by 40% in 2030. A viable extension in rice creation is essential which will give overall food security. This development in the rice creation would be possible by change of exceptional yield varieties and confirmation of diseases and bugs in cultivating field. Living being, organisms and disease are the essential blameworthy gatherings for the rice plant sicknesses. The eruption of these diseases achieves lessening of rice creation. This investigation essentially revolves around three most ordinary leaf diseases named Brown spot, Leaf influence, commonplace and Hispa. Green region accepts a basic part in field of monetary improvement for any country.

A huge part of the countries rely upon rustic things and moreover adventures concerning rough materials. Rice is one of the most evolved food crops on earth. In excess of 100 countries all around the planet foster rice. Outright assembled area is around 158 million hectares, conveying more than 700 million tons of rice yearly. When stood out from various principal handles by far most of the rice is filled in Asia. By and by adays the rising people is impacting the environment of the globe to the extent that a risky barometrical deviation, surprising climatic changes and some more.

Considering this regular changes cultivating region is getting affected. Due to natural changes crops are getting influenced with various kind of diseases. This makes serious impact on quality, sum and proficiency of yield. These days different kinds of infections impacting the rice fields, which prompts goliath impact on the making of rice all over the place. There are numerous sorts of infections which have been seen as in past two or three years, for instance, rice leaf influence, natural hued spot, hispa, rice contort disorder and some more. This diseases occur in all parts of rice like on leaf, neck and ear(Jiang et al.; 2020). Plant ailment won't simply impact the diminishing in progress of yield yet furthermore impacts the environment in regards to defilement. Among all the creation 10 to 15 degree of hardship is achieved by plant infections. In most skeptical situations it could reach upto 40 to 50 degree of disaster, which is colossal mishap for the farmers and moreover to an economy of a country. Along these lines, toward the starting stage it is imperative to diagnos a plant disorder for sensible and right cultivating, to thwart unnecessary abuse of financial and other resources(Atila et al.; 2021).

To deal with these issues of green region, Image proccesing space can be choosen. Convolutional Neural Network works outstandingly with a few AI and significant learning request computations, were CNN is used for features extarction for instance eliminating features from the open pictures informational collection. Where AI and significant acquiring classifiers have capacity to bunch the infections from the photos. CNN has a faster taking care of speed and moreover gives better game plan accuracy. The proposed model might be strong match in the classification and ID of

ailments. With some quantifiable appraisal methodologies the introduction of the model can be checked. Evaluation strategies, for instance, confusion organization, F1-score, Precision, Recall, Accuracy.

1.1 Motivation

Identification of the rice leaf diseases is the key to preventing to such diseases. The studies of the rice leaf diseases mean the studies of visually observable patterns seen on the images.

Disease detection on rice leaf is very critical for agriculture field. It is very difficult to monitor the diseases manually. So we are going to invent disease detection and prevention system over machine learning.

1.2 Goal of Research

Now-a-days most of the countries are dependent on agricultural sector. Agricultural sector also play an crucial role in the Economic development of a country. But because of increasing population environment is getting affected day by day. Because of bad climatic conditions agricultural sector is getting affected. Number of diseases can be seen in the crops. To avoid the decrement in the production and loss of farmers, early detection of disease is very important. This can be achieved through Data Analytics. The main goal of this research is to detect disease in rice leaf using Deep Learning in the field of Image Processing.

II. LITERATURE SURVEY

S.Ramesh, D.Vydekiet al. [1] stated that, this paper proposes a machine learning algorithm to find the symptoms of the disease in the rice plant. Automatic detection of plant disease is carried out using machine learning algorithm. Images of healthy and blast disease affected leaves are taken for the proposed system. The features are extracted for the healthy and disease affected parts of the rice leaf. These images are processed with the proposed method and the leaf is categorized as either infected or healthy.

Minu Eliz Pothen, Dr.Maya L Pai [2] proposed that proposed method describes different strategies utilized for rice leaf disease classification purpose. Bacterial leaf blight, Leafsmut and Brown spot diseased images are segmented using Otsu's method. From the segmented area, various features are separated utilizing "Local Binary Patterns (LBP)" and "Histogram of Oriented Gradients (HOG)".Then the features are classified with the assistance of Support Vector Machine.

PanuwatMekha, PanuwatMekha[3] proposed that experimented with image classification is used to classify the data set of rice leaf diseases, such as; Brown Spot Rice disease (BSR), Bacterial Leaf Blight disease (BLB), which is the rice leaf disease with severe outbreaks around Thailand. Moreover, image processing technology in the classification types of rice leaf disease, such as; Random forest classification algorithm, Decision tree classification algorithm.

Shreya Ghosal , Kamal Sarkar [4] stated that inthis paper, Deep Learning show that Automatic Image Recognition systems using ConvolutionalNeural Network (CNN) models can be very beneficial in such problems. Transfer Learning to develop our deep learning model. The proposed CNN architecture is based on VGG-16and is trained and tested on the dataset collected from rice fields.

Research conducted by (Atila et al.; 2021) [5] studied on plant leaf disease classification using EfficientNet Deep Learning Model. In this study, EfficientNet deep learning method isapplied for plant leaf disease classification because some traditional Machine learning algorithms do not gives better performance. Performance of this model was compared with other deep learning models. PlantVillage dataset was used for training the model. Models were trained with original and augmented datasetaving 55,448 and 61,486 images respectively. Training of EfficientNet model and other deep learning models was done using transfer learning approach. B4 and B5 model performed well in EfficientNet architecture as compared to other models. The B4 model achieved the accuracy of 99.97% with 99.39% of precision value on augmented dataset. Whereas, The B5 model achieved the accuracy of 99.91% with 98.42% of precision value in the original dataset. In the study(Sujatha et al.; 2021) [6] performance of Deep Learning VS

Machine learning methods is compared in the detection of plant leaf disease. At anytime between the farming, diseases can affect the plant. Resulting in less crop production and market value. Therefore in farming industry identification of leaf diseases play an vital role. For disease identification various Machine Learning and Deep Learning techniques are developed and examined in this research. Machine learning algorithms such as Support Vector Machine, Random Forest, Stochastic Gradient Descent and Deep learning methods such as Inception-v3, VGG-16, VGG-19 was trained



for citrus plant disease detection. The classification accuracy was quite impressive because Deep learning methods performed well 9 than Machine Learning methods. Accuracy for the model is shown as follows: RF:76.8%, SGD:86.5%, SVM:87%, VGG19:87.4%, Inception-v3:89%, VGG16:89.5%. From the result, we can say that RF is giving the less accuracy. Whereas, VGG-16 is giving the best classification accuracy.

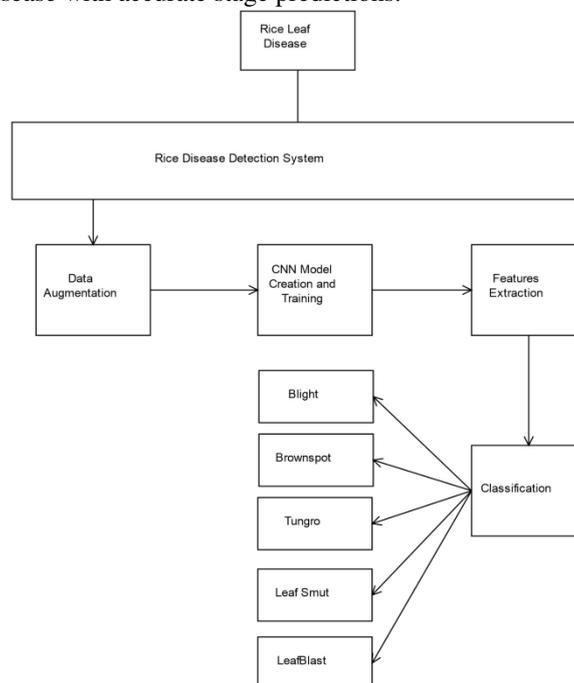
In the research(Hu et al.; 2021) [7] detection and severity analysis of tea leaf disease based on Deep learning was studied. Some Machine learning image processing methods were applied for detection of tea leaf blight showed bad results with less accuracy. Therefore, in this study deep learning methods are applied for increasing the performance of detection off disease. Retinex algorithm is used for enhancing the original image data and for reducing the light variation and shadow. Disease in the leaf was detected using Faster Region-based Convolutional Neural Networks model for improving the of blurred, occluded and small pieces of leaves. Detected images are inputted into VGG16 trained network best results. Overall analysis says that experimental results by this deep learning technique performed well as compared with traditional machine learning algorithms. The study conducted by(Karlekar and Seal; 2020) [8] depicts soybean leaf diseases classification using Deep learning methods. The proposed research consists of two modules. The first module extracts leaf part from the images by avoiding the background noise. And the second module introduces convolution neural network for recognition of plant diseases. There are total 16 categories of diseases in the dataset.

The proposed model has given the accuracy of 98.14% with the good precision, recall and F1 score. The proposed work is also compared with other methods namely VGG19, GoogleLeNet, Dense121, XceptionNet, LeNet, and ResNet50. And this models also performed well.

III. WORK FLOW

In a proposed system, we are proposing experiment on rice leaf diseases like leafsmut, tungro, leaf blast, brown-spot diseases with limited set of supervised data as shown in figure 1.

We are proposing a Convolutional neural network for feature extraction and classification. We are going to solve accuracy issue in diagnosis of disease with accurate stage predictions.





IV. CONCLUSION

We are going to invent multi rice leaf disease detection system over machine learning and CNN techniques which solves existing accuracy problem as well as reduce death rates by rice type diseases like leafsmut, tungro, leaf blast, brown-spot. After detection of disease inform to farmer that how to prevent from a disease. For future work, we can implement this technique on some more diseases with rich dataset. Increasing the number of diseases and dataset used for the process can improve the accuracy.

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