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Rice Leaf Classification using CNN with Transfer Learning

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ABSTRACT: Rice is one of the major cultivated crops in India which is affected by various diseases at various stages of its cultivation. It is very difficult for the farmers to manually identify these diseases accurately with their limited knowledge. Recent developments in Deep Learning show that Automatic Image Recognition systems using Convolutional Neural Network (CNN) models can be very beneficial in such problems. Since rice leaf disease image dataset is not easily available, we have created our own dataset which is small in size hence we have used Transfer Learning to develop our deep learning model. The proposed CNN architecture is based on VGG-16 and is trained and tested on the dataset collected from rice fields and the internet. The accuracy of the proposed model is 92.46%.

KEYWORDS: VGG16 Model, Image Recognition, Transfer learning, Rice leaf disease

I. INTRODUCTION

Rice is a really important food source. Its not just loved in India but also all over the world Unfortunately, it can get sick too! There are lots of diseases that can hit at different stages of growth. So, catching these problems early is super crucial getting great yields high quality. But here the tough part: farmers have big fields to manage. Plus, there are many kinds of diseases, sometimes even more than one disease can bother the same plant! In faraway areas,farmers often can't get quick advice from experts. And waiting for help takes too long. where Automated Systems step in! They're super useful. They help farmers by making it easier to spot plant diseases accurately. Researchers are using cool machine learning techniques like Support Vector Machine (SVM) & Artificial Neural Networks to make this happen.

II. RELATED WORK

We have appeared the engineering for the mechanized system's illness classification area in this work. Utilizing the rice illness dataset we have assembled over the final few months, we have made a profound learning approach in this work. Utilizing Exchange Learning, we were able to fine-tune the completely associated layers of the pre-trained VGG-16 demonstrate (prepared on a expansive sum of ImageNet information) to fit our claim dataset. At long last, we performed a few mistake investigation and endeavored to illustrate the reasons for the mistakes.

With exchange learning a strong machine learning demonstrate can be built with comparatively small preparing information since the show is as of now pre-trained. Subsequently we have utilized the pre-trained VGGNet and fined tuned it to classify utilizing our possess little dataset.

III. METHODOLOGY

The convolution layer, pooling layer, and completely connected layer are its three constituent areas. The third layer serves as a classifier, and the primary two combined make up the highlight extractor. The highlights that the convolutional layer extricates have less measurements much appreciated to the pooling layer. The extricated include is utilized by the completely associated layer and softmax to classify the photographs. Employing a collection of learnable channels, the convolution layer takes an input picture and extricates its highlights

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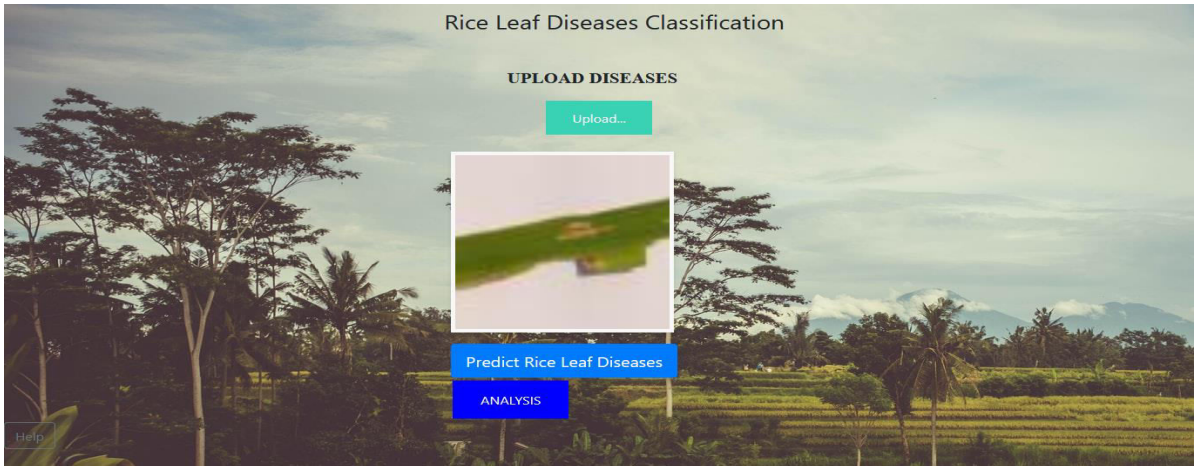
IV. EXPERIMENTAL RESULTS

Figures shows the results of Rice leaf's Diseases

(a)Image Upload page

Fig 1 : Image Uploading to identify the disease of rice leaf (a) Image Upload page



(b) Image Predict page

(c) Image Predicted Result page

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(d) Leaf Disease Image

(e) Result of a rice leaf

(f) Image uploading

Fig 3 : Image classification (a) Original image (b) Image uploading ,(c) Image uploaded and result ,(d) Image uploading of different set of criteria ,(e) Result page ,(f) Image uploading

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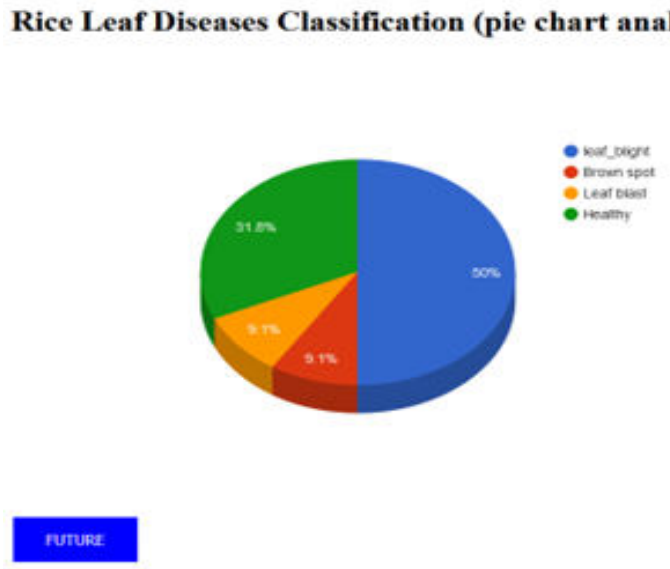

Fig 4 : Rice leaf analysis of accuracy or percentage

V. CONCLUSION

In this research, we have created a profound learning engineering that precisely distinguishes 92.46% of the test images. It was trained on 1509 photographs of rice leaves and tested on 647 other images. By fine-tuning the predefined VGGNet through Transfer Learning, the model performance was significantly enhanced. Without this technique, the model performance on the limited dataset was unsatisfactory. We obtained a cut point after which the accuracy was not increasing and the loss was not lowering on both training and validation data, therefore we decided to discontinue using 25 epochs.

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