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CNN'S RICE LEAF DISEASE CLASSIFICATION USING TRANSFER LEARNING

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ABSTRACT:
Throughout numerous stages of its development, rice, staggeringly significant crop grown in India, becomes distressed by an assortment of diseases. The farmers' inadequate experience renders it extremely hard for them to appropriately detect these diseases by hand. Innovations in Deep Learning indicate how Convolutional Neural Network (CN N) models-grounded Automatic Image identification systems may be extremely beneficial in these sorts of circumstances. Deep Learning model has been created utilizing Transfer Learning as the rice leaf disease picture dataset is not accessible by anyone. Therefore, we designed our own little dataset on our own. Using data gathered from internet resources and rice fields, its suggested CNN architecture—which is based on VGG16—is evaluated and trained.

KEYWORDS: Convolutional Neural Network, VGG16, Resnet-50, CNN, Deep Learning, Fine-Tuning, Transfer Learning.

INTRODUCTION

Not only in India but everywhere in the world, rice is the main food source. Throughout numerous stages of its cultivation, it becomes impacted by an assortment of ailments. Given the immense amount of land owned by independent farmers, the broad spectrum of illnesses, and the probability of many ailments occurring in the green plant, it is therefore preferable to diagnose and treat these diseases early in order to guarantee optimum quantity and optimal quality. However, this is extremely difficult. In rural places, acquiring specialized knowledge in agriculture can be tough and exhausting. Thus, it is crucial to have automated systems. Many machine learning algorithms have been utilized in research to help the hardship of farmers and increase the accuracy of plant disease determination.
Nevertheless, feature selection procedures have more of an impact on such systems' accuracy. Modern convolutional neural network research has eradicated the need for picture the preprocessing process and provided integrated attribute selection, paving the way for significant improvements in image-based recognition. Another obstacle involves gathering huge datasets for these kinds of challenges. Using a pretrained model on a bigger dataset is more feasible when the dataset size is comparatively small. Transfer learning may be used to build a replica that is accustomed to successfully extracting features in order to either disconnect the last Fully Connected Layer or tweak the final some layers in order acquire a more concentrated set of data.

Rice Disease Detection using CNN

A dataset including some photos of rice plants—both undiseased and diseased—chew by snails is used to train a convolutional neural network classifier. AlexNet uses transfer learning to function as a classifier. Despite being limited to identifying if a plant is ill or not, the aforementioned architecture may be taught to get an accuracy rate of 91.23%. The writers assembled few photos depicting many distinct rice stem and leaf disorders. Their architecture achieved a 95.48% performance on the test set, based on the inspiration of Le-Net and AlexNet. Preprocessing techniques included image scaling to 512*512, normalization, whitening, and PCA, due to the sparseness of the data.

LITERATURE SURVEY

[1] R. Bell, D. Carter, "A Convolutional Neural Network model for prediction of disorders in paddy plants,". The article uses leaf photos to explore the application of convolutional neural networks for paddy plant classification based on suggested health status. A CNN trained model embodying uninfected, damaged, and pathogen-infested plants was established with the use of transfer learning based algorithms. With a startup learning rate of 0.01 and a small batch size of thirty (10), the network achieved very high accuracy using stochastic gradient descent. One thousand (600) pictures of paddy plants, belongs to different varieties, were utilized during the development of CNN model. The testing and training datasets were created using images from the district's paddy fields, which agricultural technicians subsequently confirmed.

[2] P. Edward, "plant disease detection and diagnosis based on deep learning models,". In order to detect and treat leaf disorders using normal leaf pictures of both sick and healthy leaves, convolutional neural network models were built in this reference based on deep learning tactics. CNN models were trained using some group of images, which included 30 distinct plant varieties in 40 classes of [leaf, disorder] combination, involving uninfected plants. Once many model architectures were trained, the most effective model was able to identify the matched [leaf, disorder] pair (or uninfected plant) with a 99.53% success rate. The model's remarkable success rate renders it a very effective early warning system and advisory instrument. It may be further enhanced to facilitate the development of an combined plant disorders detection models that can employ in real-world agricultural settings.

[3] Y. Caishen, Y. Cheng, and Y. Guo, "Detection of Rice leaf diseases based on convolutional neural network,". Financial losses associated with rice plant illnesses and pests can be considerably decreased by promptly and accurately identifying them. Farmers may find it helpful in delivering medicines on time. Thanks to developments in deep learning, researchers can now dramatically improve picture categorization accuracy using convolutional neural networks (CNNs). In this work, we use images captured in real-world scenarios with a range of backdrops to demonstrate a breakthrough in deep learning-based rice leaf disorders and pest identification. They tested with many convolutional neural network models on our huge dataset of rice plant illnesses and pests.

EXISTING METHOD

With very limited knowledge on technology, farmers are facing many challenges to correctly identify the rice leaf diseases. The diseases of rice crops differ from one plant to another. Some are infected with pathogens, aphids, mosquitoes etc. To get beyond this obstacle, deep learning techniques can be applied.

BENEFITS:

- It might be difficult to identify and diagnose diseases.
- time-consuming;
- challenging to handle.

PROPOSED SYSTEM:

We present an automatic photo recognition tackle based on Convolution Neural Network (CNN) models VGG16, CNN, and Resnet-50. These CNN models come in quite handy for addressing these kinds of challenges. The above methods enhance the recognition and identification of the conditions. The CNN. Models are trained specifically based on many varieties of rice leaf diseases. So, Deep Learning based classification systems are very helpful in detecting plant diseases with high degree of accuracy.

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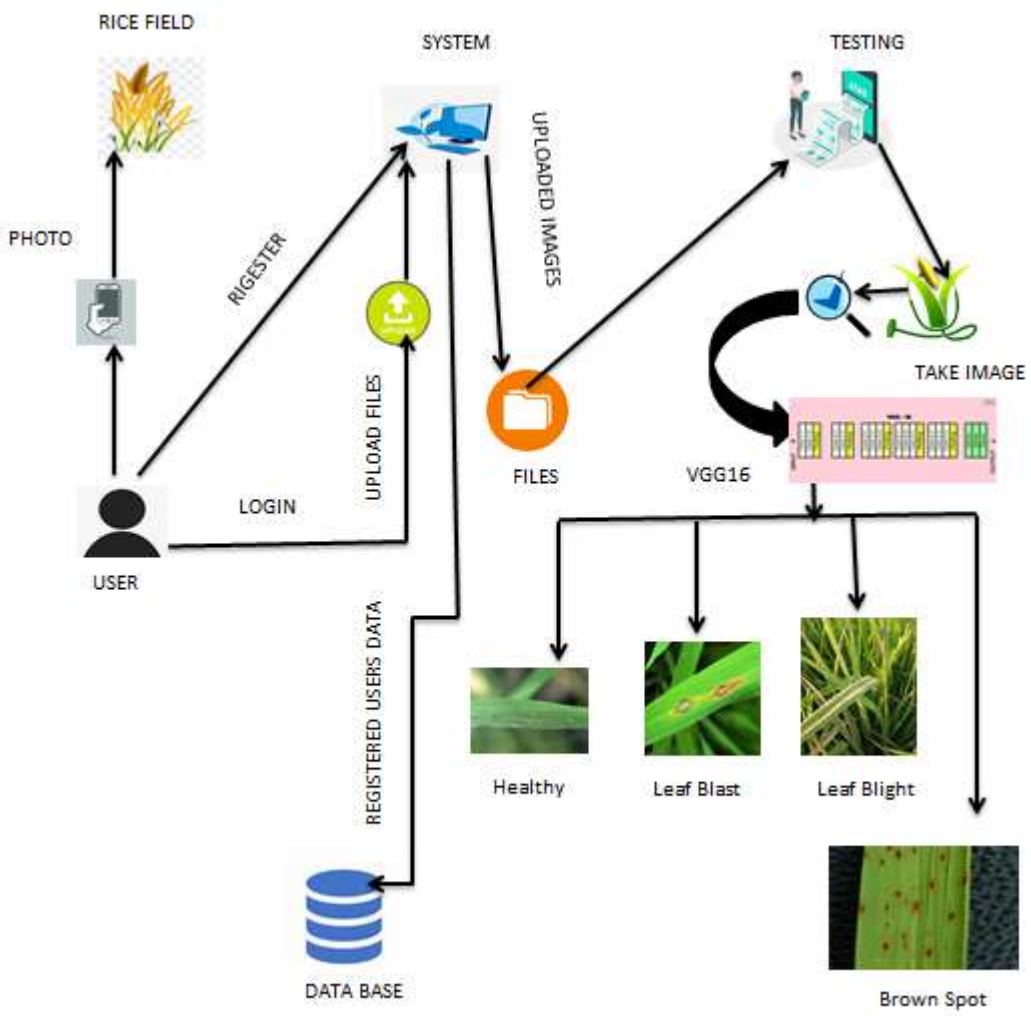
ARCHITECTURAL DIAGRAM



EXPERIMENTAL RESULTS

Upload an image :

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SYSTEM PREDICTED DISEASE IS LEAF BLIGHT

CONCLUSION:

In the entire work, we put forward a architecture on deep learning that, when tested on 467 photographs and trained on 1209 pictures of rice leaves, effectively determines 93.46% of the test shots. Through Transfer Learning, the preconfigured VGG16 was adjusted, significantly enhancing the model's effectiveness. The model wouldn't have performed well on such a short dataset without it. We chose to stop employing 25 periods since we reached a cut point when speed was not increasing and loss was not decreasing on testing and training data.