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Cotton Leaf Disease Detection and Classification Using Faster R-CNN on Field Condition Images

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Abstract*:* In many nations, including India, agriculture is a vital industry. Due to the dependence of the Indian financial system on agricultural produce, the eager The issue of food production requires attention. The Identification of crop infection taxonomies improved significantly. Both technical and economic relevance in the. Agricultural Sector. Keeping tabs on illnesses in With the aid of experts, plants may be quite expensive in agriculture-based area. The need for a system that can automated detection of illnesses, which has the potential to revolutionary Observing extensive crop fields and then plant leaves can be as soon as the sickness is discovered, treatment is taken. The The system being presented aims to create an

I. INTRODUCTION

Various illnesses prevent crops from growing in fields, which may result in significant Germs, fungi, and microbes are examples of pests. the major origin of illnessbecause of failing to crops in perfection and the size of output. Image processing was now frequently employed identify such diseases.

II. RELATED WORK

Sidharth Singh Chouhan and others .[1] provides radiation-based function Network neural(BRBFNN) based Optimization of Bacterial Foragingfor the characterization of plant leaf diseases. Identifying categorising Bacterial Foraging Optimization (BFO) technique performs better. By looking for and combining seed points with similar characteristics for the feature extraction process, the region growth algorithm improves the network's effectiveness.

M. Waseem Tahir and others .[2] provides a unique fungus dataset to help CNN identify various fungal kinds and detect fungus. 94.8 percent accuracy is provided by the CNN architecture when five fold validation is used.Ranjith and co[3] A smart irrigation systemthat uses an android mobile application to automatically regulate watering has been presented. In addition, photographs of plant leaves are taken, uploaded to a cloud server, analysed, and compared with images of sick plant leaves stored in the cloud database. The Android mobile application provides the user with a list of possible plant illnesses based on the comparison.

III. PROBLEM DESCRIPTION AND SYSTEM ARCHITECTURE

The recommended system classifies the leaf image using CNN's image classification method. It can automatically detect and classify diseases based on data obtained at each convolution layer. The graphic below shows the anticipated system's structural arrangement. The system used image processing techniques to identify illnesses. The user is required to upload an image of a cotton plant leaf. Before employing CNN, the system has the capability of preprocessing an uploaded image. The CNN method may be used to test the picture against a training dataset and extract features.

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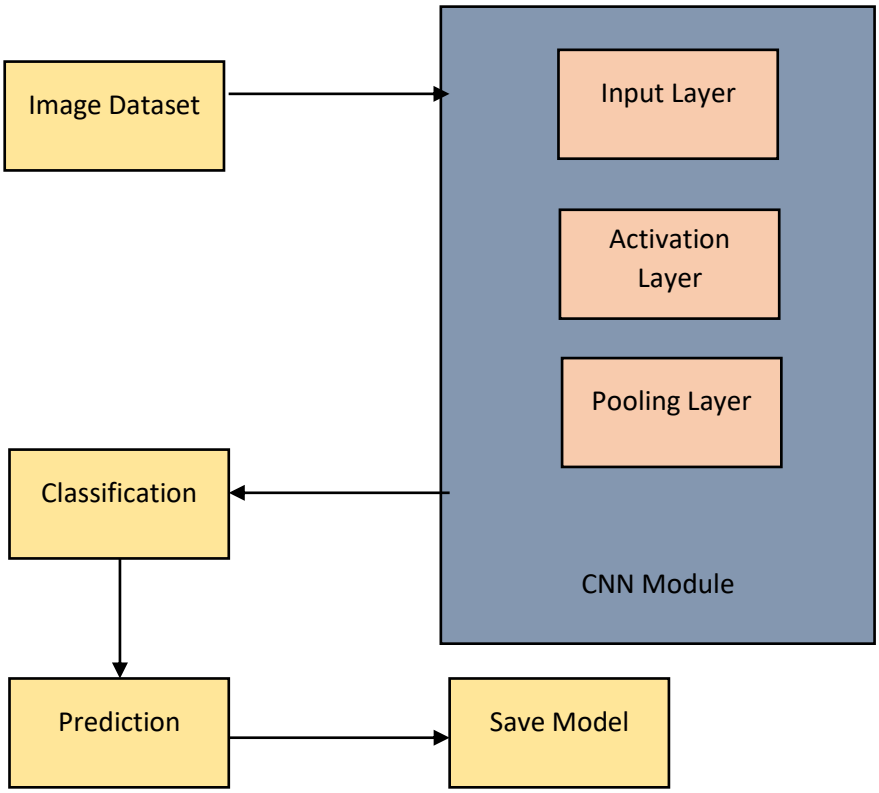
Machine vision techniques, which have great promise, especially in the field of plant protection and crop management, are heavily utilised in the science of agriculture. The recommended technique for plant leaf disease identification is based on images of various plants that have been affected.

Fig 3.1: The Proposed System's Architecture



IV. METHODOLOGY

Using the image classification technique CNN, the suggested system categorises the leaf picture. Based on information retrieved at each convolution layer, it can detect and identify illnesses automatically. The structural layout of the intended system is depicted in the image below. To diagnose diseases, the system employed image processing techniques. The user must provide a picture of the cotton plant leaf. The system has the ability to preprocess a picture that has been uploaded before using CNN. The CNN approach allows the system to test the picture against a training dataset and extract the features and detect the disease and suggest the treatment for that disease

V. RESULT AND DISCUSSION

The goal of this application is to develop a system that can recognise agricultural illnesses and give users information about the diseases that have been found, the pesticides that should be used, and their costs.
A user must submit a picture in order to utilise this programme. Finally, using CNN, plant disease may be predicted.
Both healthy and Alternaria macrospora and bacterial blight-affected leaves are photographed in the collection.
There are 207 pictures in the testing dataset and 513 in the training dataset. Training has an accuracy of just 80% as opposed to testing's 89 % accuracy. As shown in the figure 4.2

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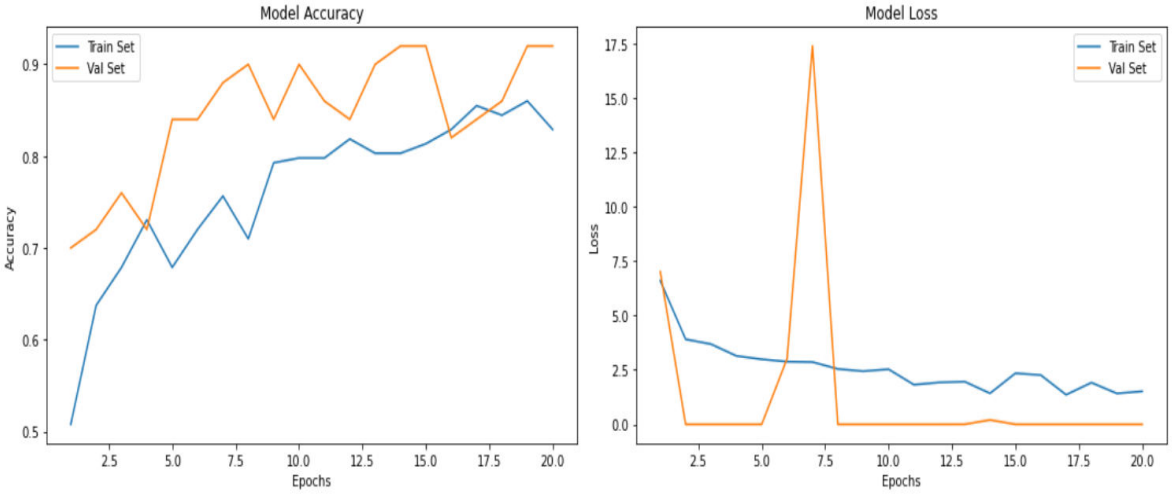

Fig 5: The Model Accuracy and Loss

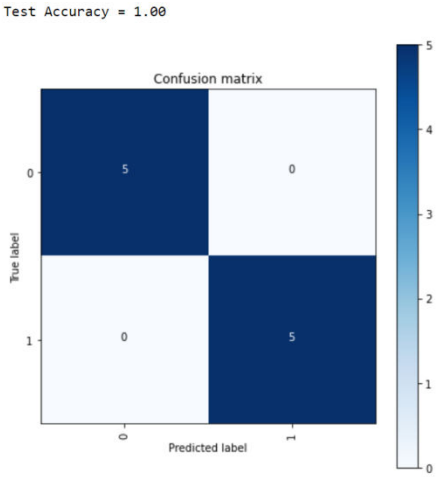

Fig 4.2: Confusion matric for Test Accuracy

VI. CONCLUSION

In this thesis, the main goal is to apply machine learning to detect illness in Cotton on any surface (CNN). The best technique for spotting this kind of thing, according to our research, is the VGG16 Architecture. The validation accuracy for this model, however, is 95%. We've worked hard to attain the highest accuracy with our extensive data collecting. We think that this kind of endeavour will be crucial for our agricultural sector. In this Indian hamlet, the vast majority of the farmers are uneducated and ignorant about the disease. They are unable to find out how illness is discovered. The bug is harming the cotton plant and leaf as a result, endangering our farmers.Because this initiative includes fertilisers for every ailment and provides usage instructions, we think it has a chance of success.

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