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An Effective Accuracy-Based Disease Prediction on Paddy Cultivation Using Machine Learning

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Abstract : The project has entitled as **"**An Effective Accuracy-Based Disease Prediction on Paddy Cultivation Using Machine Learning", and developed by using Python as front end. Rice leaf diseases are a major problem in economic and production losses in the agricultural industry worldwide. According to the CNN algorithm, rice leaf image details are taken by the existing packages from the front end used in this project. However, it can take a few moments. So, this proposed system can be used to identify rice leaf diseases quickly and automatically. Local Binary Pattern was used for feature extraction and Support erosion method was used for creating the model. According to this approach, rice leaf diseases can be identified in the average accuracy of 79% and its' stage can be identified in average accuracy 66%.

Keywords: Disease Prediction , Paddy cultivation

I.INTRODUCTION

Toward the start of the 21st century, paddy (Oryza sativa species) is as yet the main oat in human food frameworks and the principle wellspring of energy and a critical portion of proteins devoured by very nearly three billion peoples. More than 90% of the world's paddy is produced in the Asia Pacific Region In Bangladesh, paddy is the key producing crop food, about 75% of the absolute edited region, and over 80% of the all-out watered zone is planted to rice.

There are three main types of paddy diseases such as bacterial disease, fungal disease, and miscellaneous diseases. These include subcategories like bacterial blight, bacterial leaf streak, brown spot, leaf smut, leaf scald, panicle blight, bronzing, etc.. Note that the incidence of diseases has of late gotten extreme because of the unfavorable impacts of climate change, especially the ascent in temperature (IPCC, 2007).

The Revolution of Artificial Intelligence has made it easier to maintain a standard of living. Like all other sectors, there is no shortage of AI contributions in the agriculture sector.

In this project, it focused on four paddy diseases as Brown Spot, Leaf Blight, Leaf Smut, Bacterial Leaf Blast, and one healthy leaf. This paper selected the Deep Convolutional Neural Network and trained the dataset on the four CNN based pre-trained models.

II.LITERATURE REVIEW

1.Pomegranate Disease Detection Using Image Processing

Recently, many people have done researches for detecting rice leaf and vegetable diseases using image processing and deep learning. According to the research paper, authors had used image processing technology to identify the pomegranate diseases. Image preprocessing was the first step of the methodology

2.Adapted Approach for Rice leaf Disease Identification using Images

The authors presented the image processing based approach for rice leaf disease detection. First, read input image and transformed it from RGB to L*a*b color space. Because the colour information in the L*a*b colour space is stored in only two channels. Input images were partitioned into four segments using K-means cluster in this research. Because the empirical observations it was found that using 3 or 4 clusters yield good segmentation results.

3.Classifier Based Grape Leaf Disease Detection. India,

The author had used SVM classification for identifying and classifying the grape leaf diseases. Grape leaf images were taken using a digital camera and those were used to both training and testing the system. Collected images included the leaves infected by Powdery Mildew and Downy Mildew. Removing background noise and resizing to 300*300 PX to improve the image quality were done under the image preprocessing. Gaussian filtering had been used to remove noise in the image.

4.Leaf disease detection using image processing.

Authors had used image processing technology for identifying the leaf diseases. First authors selected the plants, which were affected by the disease and then took the snapshot of the diseased leaf. Contrast enhancement and converting RGB to HIS was done under the image preprocessing step. K-means clustering algorithm was used to cluster the object based on the feature of leaf into k number of groups. SVM algorithm had been used in this system for classification purpose. SVM is a statistical learning-based solver.

5.Pomegranate Disease Detection Using Image Processing Techniques.

Authors had presented the image processing based system to identify pomegranate rice leaf diseases. This rice leaf is mainly affected by Bacterial Blight, Anthracnose and Alterneria. After capturing the disease images, image resizing, filtering, segmentation, morphological features were used to preprocess the images. Image segmentation is the process of dividing the image into multiple parts. Colour-based segmentation was used in this research, such as clustering, YCbCr, RGB, L*a*b and HSV.

III.Proposed Methodology

There are six phases in this methodology. Those are Image Acquisition, Image Preprocessing, Image Segmentation, Applying training dataset, Experimental results.

1.IMAGE ACQUISITION

In this phase, the sample images are collected, which are required to train the classifier algorithm and build the classifier model. Yellowish or Reddish passion rice leaf variety was selected to take sample images. Because the yellowish variety is widely cultivated in our site. The standard JPG format was used to store these images. In this study, images were collected from farms in different regions. Passion rice leafs infected by scab disease and woodiness virus that had been included in collected images.

2.IMAGE PREPROCESSING

After the image acquisition, image processing was done for improving the image quality. All original passion rice leaf images were stored in one folder. Those images were named as we like our wish can take any value of numbers. Only horizontal images were rotated by 90 degrees and resized by 200x300 pixels. Vertical images were resized by 200x300 pixels and when the width and height of the image are same, those images were resized to 250x250 pixels.

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4.IMAGE SEGMENTATION

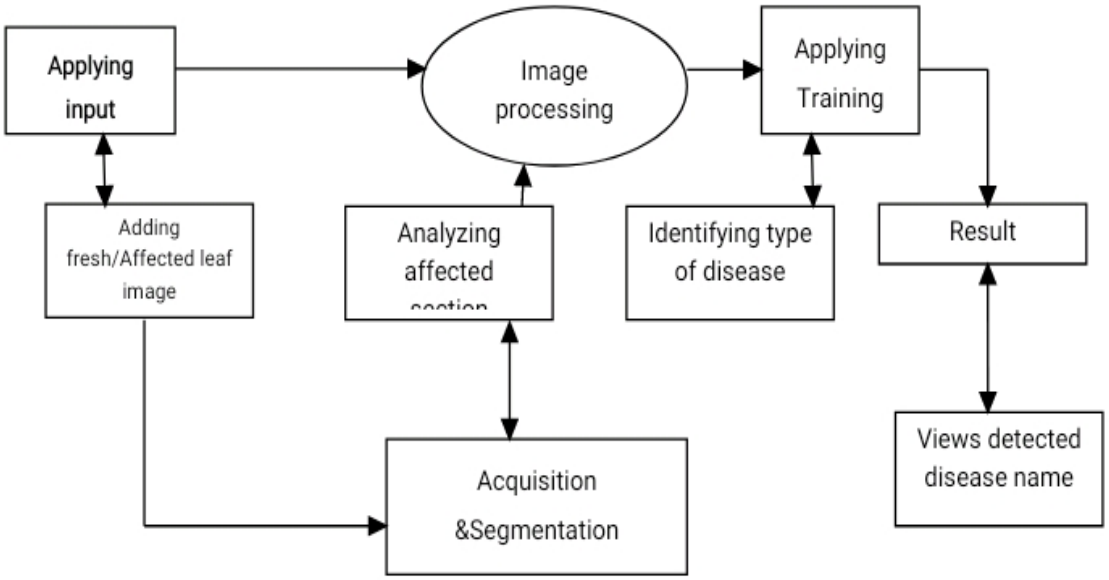
The third phase of the methodology is image segmentation. As the first step, all preprocessed images were converted into L*a*b, HSV, Grey color models and kept one in the original way (RGB). Because the identifying suitable color model for preprocessing is one of the outcomes of this research. After that, the image was converted to binary format. This format values were clustered using the CNN algorithm. According to the algorithm used an image segmentation were done.

5.APPLYING TRAINING SET

The fifth phase of the methodology is applying training set images. The segmented output were done, which were created using feature extraction. However, three image sets were created to do experiments. Preparation of those image sets is discussed here. Field expertise support was taken for the categorization of images and each image were selected from the categorized sets of an image randomly.

6.EXPERIMENTAL RESULTS

After converting the input image into histogram format, it starts compare to training set images. When the histogram format of the input image is matched 85% above with any one of training set images it will show the disease name as a heading of image shown.



IV.FINDINGS :

This research can be carried forward with more varieties of leaf diseases and more fine-tuned CNN models with the expectation of finding better accuracy and ensuring faster detection. A detailed comprehensive study is a must to understand the factors affecting the detection of plant diseases, like the classes' datasets, and size of datasets, learning rate, illumination, etc. The basic form of paddy plant diseases changes with the passage of time or the background of the images, images with colour issues, hence, these convolutional neural network models should be modified to enable them to detect and classify diseases during these complex or problematic situations.

The application become useful if the below enhancements are made in future.

1.In future the application is designed as web service, it can be integrated in many web sites.
2.More accuracy can be detected using various machine learning algorithms.

The application is developed such that above said enhancements can be integrated with current modules.

V.CONCLUSION:

An image processing based solution is proposed and evaluated in this project for the detection and classification of rice leaf diseases. The proposed approach is composed of mainly three steps. In the first step image segmentation is performed using convolutional neural network technique. In the second step affected places are found. In the third step training and classification are performed. This project will support Indian Farmers to do smart farming which helps to take time to time decisions which also save time and reduces loss of plant due to diseases. The leading objective of our project is to enhance the value of rice leaf disease detection.

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