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Prediction of Plant Pathology Through Image Processing by Blob Technique

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ABSTRACT:

India is a vast country with full of agriculture and the country's development is based on Agriculture. As we know Farmers are the Backbone of our Country their hard work and sweat in this sector help us to become stronger and healthier. Sometimes it becomes difficult and tough for farmers to produce good yields even though they have chosen the right crop for the existing season. The major reason behind this situation is Plant Diseases and it becomes difficult for farmers to figure out these diseases. Plant Diseases are the major threats in the agriculture sector where it depleting plant growth. This leads to low-level yielding as some infective worms are inhibiting these plants. To eradicate this type of disease a method which is known as the BLOB technique is used. BLOB analysis is a method in image processing where it identifies the features and shapes of an object, In this we use Convolutional Neural Network (CNN) method. So, this will be performed on the leaves of a plant to identify characteristics and features of the leaves for predicting the diseases through a web page prediction.

Keywords *– Image processing, Convolutional Neural Network, Blob analysis, Feature analysis, Segmentation, web page prediction.*

I. INTRODUCTION

These days, the fields of agriculture, security, and medicine all use image processing extensively. In the agricultural industry, numerous studies and breakthroughs are being made towards the evaluation of plant diseases. agriculture is one of the exciting uses for image processing. It is possible to grade the fruits and determine their ripeness of the fruit using image processing. Potato, tomato, and maize are three plants that are frequently afflicted by the illness. These plants are typically afflicted by the diseases of corn common rust, tomato bacterial spot, and potato early blight. The Xanthomonas vesicatoria bacteria, which can harm both the plant's leaves and fruit, is what causes tomato bacterial spot disease. Each stage of the plant's development can be impacted by this disease. Potato Another disease that affects leaves and manifests as a small, erratic scatter is Early Blight. Grey to brown. In addition, the plant is home to a dozen different types of fungi. This fungus can cause premature defoliation of plant leaves and fruit. In addition, the productivity of the plant may be impacted when these fungi attack the leaves and fruit. A healthy tree is necessary for producing the fruit of good quality, and any plant diseases must be caught early on. As a result, in this study, a strategy is suggested for identifying plant diseases by combining CNN with an image processing methodology.

Fig.1: Leaf Blight on Leaves

Our country follows various methods and techniques for agricultural purposes for its development. However, farmers are facing many difficulties to secure good production, and some of the factors affect the growth of plants along with this some plants are dead due to some diseases. So, in this way, farmers are facing some difficulties in the agriculture sector. In this, we proposed a system that is Binary Large Object Detection Technique through image Processing and also used a Convolutional neural network model which is supervised deep learning and using Django web server. This will detect the plant disease based on the blobs on the leaves which are circular. In this, the Pixels of the leaf are examined and Blobs have been identified to detect

whether the plant is unhealthy. Agriculture is a boon for our country and this project focuses on identifying the diseases that are related to plants and trying to overcome these types of problems that raises in the field of the agricultural sector.

II. LITERATURE REVIEW

From a farmer's perspective, the three most crucial metrics in agriculture are canopy, yield, and product quality. Thus, the usage of image processing can be employed to enhance measuring, irrigation, and fruit sorting decisions. The detection of trees, the counting of apples, the detection of diseases, the detection of fruit ripeness, and the detection of fruit quality are a few examples of image processing applications in the agricultural sector. Detecting Disease of Jute Plant using the processing of images and machine learning to learn.

Detecting the Disease of Jute Plant Using Image Processing and Machine Learning:

In this paper, they illustrated a method for spotting jute plant disease using image processing. The size of the image that will be kept in the database is checked after the plant's image has been captured. The image is then cleaned up and given a quality boost. The image is subjected to hue-based segmentation using a unique thresholding formula. The image is then changed from RGB to HSV to help determine the area of focus. This suggested method will be useful in the search for stem-focused illnesses of jute plants. Jute plant detection involves several processes, including sending the image to the server and employing RGB image acquisition there to perform image segmentation. Classification of Grape leaf Images based on machine learning technique for accurate leaf disease detection.

Grape Leaf Image detection based on machine learning technique for accurate leaf disease detection:

The main danger to the grape business and grape crops is grape leaf disease. To stop the spread of the disease and its effects on farmers, as well as to boost development and improve production in the grape business, it will be necessary to identify this grape disease in its early stages. Early detection of this grape leaf disease is extremely complex and difficult. To accurately identify the grape illness, a technique for the early detection of grape leaf disease utilizing machine learning is implemented in this study. To identify leaf illnesses, the Convolutional Neural Network based Classification (CNNC) model and the K-Nearest Neighbor model are introduced. To provide structural, pattern, boundary, and discriminative information, high-quality histogram and extended features are obtained. Finally, using the high-quality gradient-based features that were obtained, the classification process is carried out. Using the Plant-Village Dataset, a public dataset, the suggested CNNC and IKKN model's accuracy is examined. Comparing the performance of the proposed CNNC and IKKN model with several conventional classification models, classification accuracy is taken into account.

Disease detection and maturity in tomato using computer vision:

This post will go through tomato disease diagnosis using computer vision. A threshold value initially converted a binary picture from a greyscale image. This algorithm is employed to segment pictures. Red, Green, and Blue are displayed as threshold values. Nevertheless, thresholding is not a reliable method because it can only distinguish red tomatoes from other colors. It will be difficult to get tomato fruit that is both ripe and unripe. This issue can be resolved by employing K-means clustering, which can distinguish between ripe and unripe tomatoes as well as between healthy and diseased ones... K-means generates a predetermined number of non-hierarchical groups. Iterative, numerical, unsupervised, and non-deterministic best describe this method. To enhance the image's feature by separating the sick areas from the leaves, the RGB image was then converted into YCbCr. The final two procedures involve determining ripe and unripe tomatoes and calculating the infection percentage. Tomato crops are regularly impacted by the disease known as Septoria Leaf Spot, which results in dark brown patches with a purple border and a light grey center on plant leaves. Although it causes the leaves to turn yellow, infection-related leaf loss is what causes most of the damage. In this investigation, tomato ripeness was determined using the color of the leaves and the presence of a fungus.

Detection of Paddy Leaf Disease using machine learning and Image Processing:

. The disease is known as Septoria Leaf Spot, which causes dark brown spots with a purple border and a light grey center on plant leaves, and frequently affects tomato crops. Although it makes the leaves yellow, most of the harm is caused by infection-related leaf loss. In this study, the color of the tomato leaves and the presence of a fungus are used to estimate tomato ripeness. To start with, a thresholding technique was used to gauge tomato maturity. A switch to the k-means clustering technique is performed to make the system more universal and self-adapting. Lastly, a comparison of the two approaches was conducted to determine whether the approach is better suited for various situations. Moreover, a novel machine vision system has been proposed that examines. A linear combination of the RGB planes with the parameters r = -0.884, g = 1.262, and b = 0.311 was used to distinguish vegetation pixels. Utilizing genetic algorithm optimization, these coefficients are discovered.

The primary goal of the image analysis was to separate the images using color and form attributes. Feature Extraction for Shape in (A) An image's form is an important component. People commonly understand and differentiate objects based on their shapes. General descriptors like the object's size, width, and length can be used to define its shape. These characteristics are used to extrapolate features from the lesion. In this study, the objects in label-led regions of a noise-free binary image are counted using blob analysis. Spreads in the backdrop and foreground only add up to a little amount. The input image is first converted into a binary image via image segmentation. Thereafter, it is subjected to the feature extraction process.

The main focuses of the picture analysis were color-based segmentation and shape feature extraction. Feature Extraction for Shape (A) The shape of an image is important. An item is commonly understood and distinguished by its shape. General descriptors like quantity, width, and length are essential in describing an object's shape. The features of the lesion are extracted using these parameters. Blob analysis is used in this study to count the items in label-led regions of a noise-free binary image. Spreads in the foreground and backdrop add up to a minimum. Image segmentation is the first step in the process

of transforming the input image. The number of features affects how big the hyperplane is. use the training vectors. The proposed method can detect the disease earlier on when it first manifests itself on the leaf. So, it might be possible to reduce the loss and the expert's reliance. It can be useful for someone less knowledgeable about the illness. Based on these goals, we must identify the traits that are unique to the condition. Although diseases in plants are relatively common, this is one of the reasons why plant disease detection is vital in the agricultural business. We anticipate that by striving to present a methodology for identifying and diagnosing plant leaf diseases in this work, farmers everywhere will be able to improve the health of their crops and treat those who are afflicted.

Early Automatic detection of diseases of rice leaves using machine learning methods and hybrid deep learning:

Recognizing plant leaf disease is essential for the long-term viability of agriculture. For the purpose of identifying rice diseases, numerous artificial intelligence (AI) and technologies based on machine learning (ML have been used. However, those techniques either produced a significant output loss or had delayed recognition. To solve this problem, a sophisticated and accurate detection system is now required. In this study, three different types of plant diseases that harm rice are analysed. Of the six diseases that can harm rice plants, bacterial leaf blight, brown spot, and leaf smut are three of the most common. In the suggested method, features are extracted using a The VGG-16 model transfer learning with Faster R-CNN deep architecture. The process of collecting, transferring, and categorising the data was done using the random forest method. The radish field was separated into three unique areas by the random forest classifier. The UCI ML Repository is where the pictures of rice plant leaves were found. The suggested method achieves a class prediction accuracy for rice disease imaging of 97.3% on average. The results of the extensive experiments show that the suggested method is valid, and that it can successfully identify rice illnesses.

Disadvantages:

1. Unfortunately, most past Plant diseases are focused on one plant prediction like grape, jute, paddy, etc. Some of them also include the IOT based where they will predict diseases through the sensors.

2. Sometimes the values may be taken wrong due to the atmospheric conditions so it will lead for the wrong prediction of the diseases.

3. There may be some limitations or boundaries associated with the previous projects which may stick to only one plant disease detection.

3. METHODOLOGY

The methodology will be start from gathering the diseased images and pre-process the plant disease image data. Then CNN model has been trained according to the characteristics of the diseased leaves. The model should be saved after the training. After the development of the CNN model it should be integrated with the Django development server to create a web application that can be used to predict plant diseases from the uploaded images. Finally it should be deploy and testing should be done. Our project is run in the local server. After running we will get the link to our prediction page so user can upload the affected leaf image and check the status of the plant. This will also gives us the remedies and its causes for occurring. The infected leaf will give us the diseases associated with it. In this way the diseases can be predicted in plants by using of this convolutional neural network.

Proposed system and Advantages

The proposed methodology in this topic is predicting the diseases using Image Processing through CNN along with the web application for the result. We collect various sample images after that we will train the data as per the requirements for the project needed like the images have been segmented for processing. During the process the pixels have been checked and by using RGB we will identify the bacteria affected area of leaves. So the affected area may be in color of brown, black etc.. Some threshold energy is used for performing two dimensional filtering. We perform edge detection, the affected part having pixels nothing but blobs which identifies the un healthiness of leaf. Defective part is filled with numerous blobs and perfect part filled with no blobs, So by using this CNN it will predict the type of disease that a particular plant is suffering with, for this a webpage has been created so that we can capture the image upload it for prediction. In CNN we used the ReLU activation function along with pooling so that the trained data will be accurately gives the values and output as disease based on the highest priority and features contained by leaves uploaded.

- **Accuracy:** This method will helpful to predict the disease of a plant with good accuracy so that we can able to know the remedies of that disease easily in order to avoid those diseases.
- **Time Management:** This will surely help us in saving a lot of time because we can’t able to inspect or manually check all the plants in the field so with this we can able to capture the images of plant through camera without checking all.
- **Diagnostics:** This method will play a major role in the field of agriculture where farmers can able to know what kind of pesticides are needed for eradication of these deadly diseases.
- **Cost Management:** This can save us a money because without knowing the actual disease if we buy some other pesticide it will not produce a good yield. So, with the help of these method farmers can recognize the usage of pesticides and save their money.
- **Provide remedies:** This project will provide us the remedies like how to overcome the diseases that are occurred in a particular plant so that user can able to treat the plant with the correct usage of pesticides or the lands where it grows well

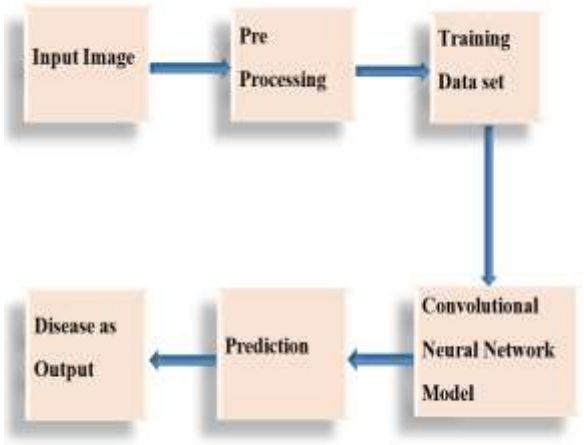

Fig.2: System architecture

MODULES:

We created the following modules for this project.

1. Pre-Processing of Data.

2.Building the Convolutional Neural Network Model.

3. Training the Model.

4. Evaluating the Model.

5. Deploying the Model in a Web.

4. IMPLEMENTATION

In this Implementation/execution of the project it uses the CNN model along with the Web page prediction. Convolutional Neural Network is a deep learning neural network model sketched for performing on a wide range of image recognition tasks. This is widely used in computer vision, Image processing and other related fields. This CNN apply a filter to an input to create a feature map that summarizes the presence of detected features to the input.

Pre-Processing of Data:

This data has been pre-processed initially so that there will not be any errors during the training and testing of the dataset for the importing.

Building the Convolutional Neural Network Model:

After the pre-processing the system will build the CNN model for performing the datasets and check for the features and characteristics of the diseased leaf.

Training the Model:

The dataset has been sent for the training of the model along with the testing, so the model can easily understand the disease features and properties.

Evaluating the Model:

This evaluation has been done for the imported dataset in order for the increase of accuracy of the trained model.

Deploying the Model in a Web:

Finally the trained and tested model has been deployed into the web application by running in a local server for prediction of the disease.

When predicting or building a model, it is sometimes not necessary to use all of a dataset's columns (attributes) values. These unnecessary traits can be taken out.

This data was gathered by browsing plant village dataset. This contains various samples of datasets our project focusses on taking three species from the data set. They are Potato early Blight dataset, Tomato Bacterial spot dataset, Corn Common rust dataset. Thus these three sets are trained with the CNN model and they were tested we use 80 percent for the training and 20 percent for the testing of the data.

The Datasets that we have taken are in the below in which they trained and extracted the features and characteristics while training and prepared the trained and test datasets.

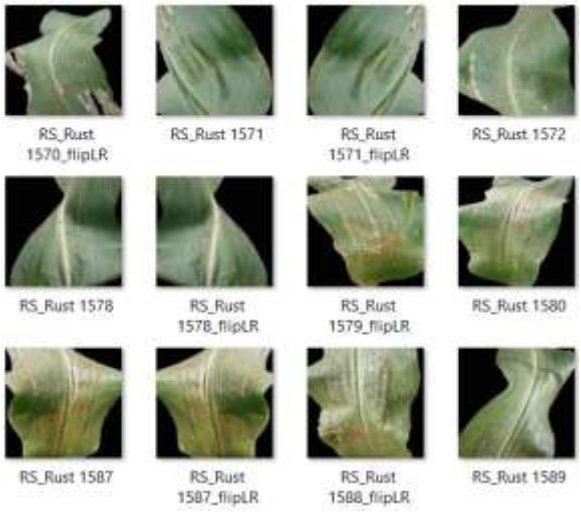

Fig 3: Corn Common Rust Dataset

The following are the Tomato Bacterial Spot Disease leaves dataset which has been taken for testing.

Fig 4: Tomato Bacterial Spot Dataset

The following are the Potato Early Blight Disease leaves dataset which taken for the testing,

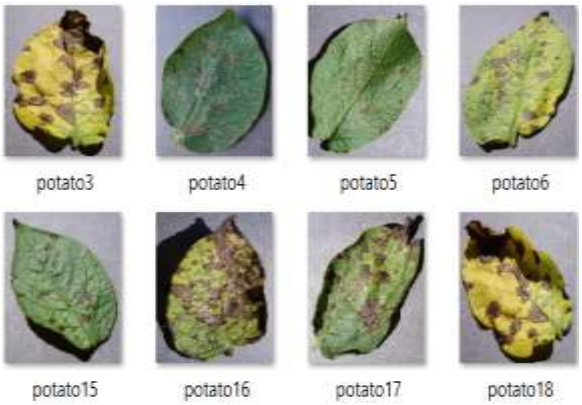

Fig 5: Potato Early Blight Disease Dataset

5. EXPERIMENTAL RESULTS

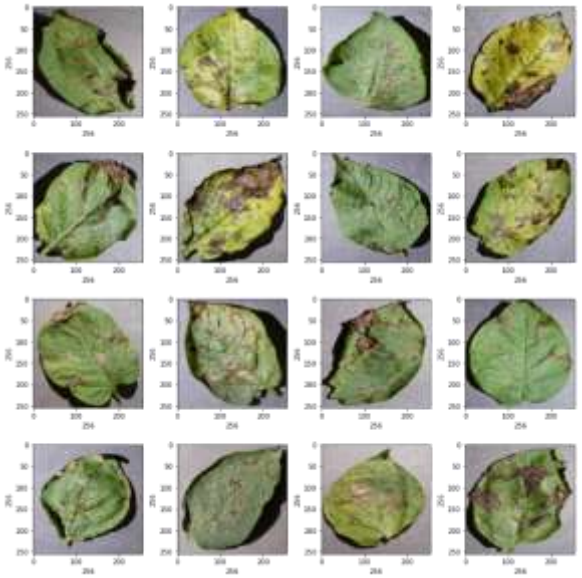

Fig 6: Pre-Processing of Data

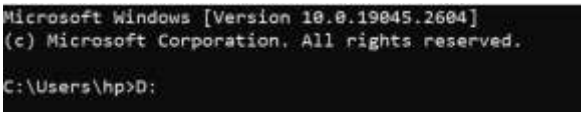

Fig 7: Changing to D Drive

Fig 8: Changing the Directory

Fig 9: Running the Django development server

Fig 10: Provide the app route with the address

Fig 11: Output/Result

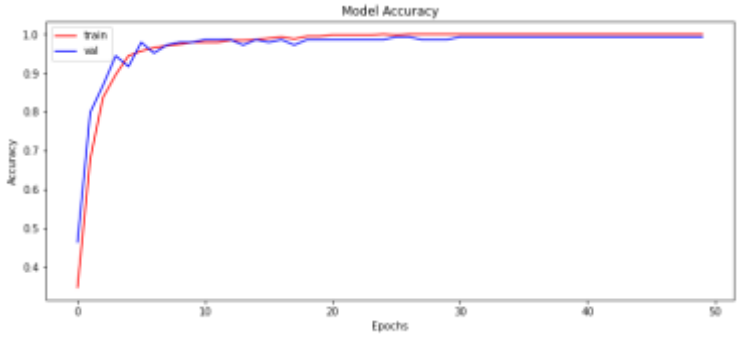

Fig 12: Model accuracy

6. CONCLUSION

This project mainly focuses on the problem of the farmers which helps them with good cultivation. We created a web page where the plant leaves containing different diseases are checked and identified the problems like particular diseases associated with the leaves of plants. They can also know about the remedies associated with the particular disease to eradicate them. This uses the CNN method where the images of the different leaves or data set have been pre-processed, trained, and tested. In this Blobs have been mentioned which means the pixels of the leaf where the affected part with the disease has been found that part has been filled with blobs and are combined. Developed a model that works the CNN method and predicts the output in the form of disease whenever an image has been uploaded. This can easily save time, cost and it can effectively work, decreasing the burden for humans from the manual inspection of the leaves. Because checking every plant on the farm may not be possible and it will take a lot of time and becomes stress for the farmers. Sometimes there may be errors in manual inspection like the leaf color and the disease color may be similar so this may lead to the misjudgment of the people. To stop all these activities this prediction of plant pathology through image processing can easily helps in detecting the diseases of the plant.

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