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Estimation of Plant Disease Detection Using Deep Learning

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Abstract - In this project, we want to use an image processing-based Web app to find plant diseases. We are developing a web application that would capture the image and send it to the database for verification and analysis. Once more going through the image processing stages, the obtained image will then be compared to the harassed built using the dataset of photos. The findings will be sent to the user if the photographs match.

Key Words: image processing, plant disease, python, flask, CNN, etc.

1. INTRODUCTION

Since plants play a significant role in our daily lives, it is necessary to preserve them and keep them safe from any threats. Humans and animals both rely on plants for their daily sustenance. Millions of living things rely on plants to meet their daily needs, therefore our ability to protect both people and plants depends on us.

Crop diseases have caused a lot of issues and harm to farmers in recent years. They have lost their lives as a result of the harm. Farmers find it challenging to safeguard their crops and take precautions to assure their safety because they are unaware of the disease. After identifying the patterns and spots on the surface, properly handling them is another crucial step.

The farmers' only remaining option is to consult the professionals. However, it may prove costly to find them on time, search for them, and confer with them often after travelling a great distance. Therefore, developing software tools for disease identification might aid in their prevention and thereby lessen the damage at the earliest stages [1].

Up to 30% of crops are lost each year due to fungus and plant viruses. This justifies the significance of early disease detection in plants. However, laboratory tests can be costly and time-consuming. Now, scientists are working on a quick, inexpensive test that may be used on the spot. The first step in preventing reductions in agricultural product productivity and quantity is the identification of plant diseases. The research on plant diseases refers to examinations of patterns on the plant that may be observed with the naked eye. Monitoring plant health and spotting diseases are essential for sustainable agriculture. The manual monitoring of plant diseases is highly challenging.

It necessitates a huge amount of work, knowledge of plant diseases, and lengthy processing times. Consequently, plant disease detection uses image processing. Image acquisition, image pre-processing, picture segmentation, feature extraction, and classification are processes in the disease detection process.

In this project, we outline the creation of an Web application that will assist both farmers and the general public in identifying plant diseases. The user or farmer must use their Web application to take a picture of the sick leaf. The application will send this image of the sick leaf to a database server for additional processing. To extract the crucial details from the sick leaf, image feature extraction will be used. The process's outcomes will be displayed on an Web device.

They will find that a web application is an affordable way to meet their plant detection needs, and it will assist them in maintaining the safety and health of their plants, assuring the wellbeing of both people and plants [2].

1.1 LITERATURE SURVEY

The five common apple diseases Alterna leaf spot, Brown spot, Mosaic, Grey spot, and Rust all severely reduce apple yield. To ensure the healthy development of the apple business, the current research does not yet have an accurate and quick detector of apple disease. It is possible to think of object detection algorithms like SSD, DSSD, and R-SSD as having two parts: The pre-network model, which serves as an essential features extractor, is the initial section. The second uses a multi-scale feature map in an auxiliary structure for a detection [1].

The leaf image is divided into four clusters using a K-means segmentation and the squared Euclidean distances. For both color and texture features, the Color Co-occurrence technique is used for feature extraction [4]. Utilizing a neural network detection strategy with a back propagation mechanism, classification is finally completed. The total system's accuracy in identifying and classifying diseases was determined to be 93%.

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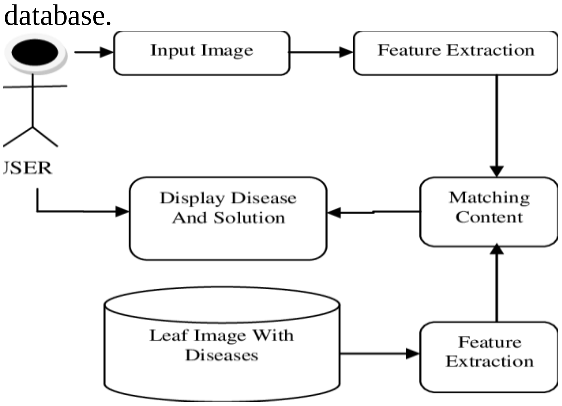
2. EXISTING SYSTEMS

Plant disease detection has grown in importance as a means of ensuring plant health and of taking the required precautions to save plants from deteriorating and costing farmers a lot of money. To get knowledge that will eventually aid in enhancing the quality of plants, there should be ways of identifying and classifying illnesses. Consequently, patterns on the plant's leaves will aid in determining what issue it has[3].

The researchers have created a number of image processing and pattern recognition approaches for the detection of diseases that affect plant leaves, stems, lesions, etc. The sooner a disease emerges on a leaf, the sooner it should be recognised, and the sooner appropriate actions should be taken to prevent loss. Therefore, a system that is quick, precise, and less expensive should be created.

3. PROPOSED SYSTEM

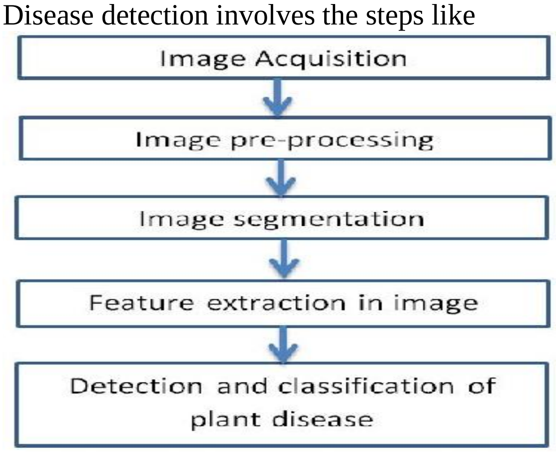
In this project, we're going to create an Web app for spotting plant illnesses. Initially, we must use a Web device to take a picture of a sick leaf.
After that, a database server will get the taken image for additional analysis and feature extraction. The server will get a picture, on which it will run image processing operations to pull out the key details of the sick leaf.
In the beginning, we will build a database of negative images, or the ones that aren't affected. Then, we will take an image of the diseased object and bombard the hundreds of negative images in the database with it. This set of positive images will then be stored separately in the database.



The blasted images will be trained, and files with the threshold values will be stored in the database. This threshold values are created into an xml file. The threshold value of the input image will be compared to this threshold value. An image taken using a Web device will be referred to as an original image and contain some noise. So, the image will undergo noise reduction. The RGB image will be converted to grayscale for additional processing after the noise has been removed. The coordinates are used to create a rectangular box for the detection process that is 20x20 in size. This size is suitable for detection because a positive image that is larger than this will require more time to process. The programmed turns by turns, according to the provided coordinates, scans the entire input image for the presence of the affirmative image after assigning parameters like height and width. If the system obtains the range of threshold values obtained from the training set for the input image, it then uses the threshold values to decide if the plant is diseased or not, and if it is, whether it has a bacterial or fungal disease. The photos are stored in Drive storage, which was utilized to construct this system in Python.

Sample images from Plant Village dataset for 38 types of leaf diseases

Disease detection involves the steps like



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[1] Image acquisition
The image is chosen in this phase using the Web app that was used to take the picture. Either the image can be imported from the Drive storage or it can be captured.

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[2] Image pre-processing
Pre-processing on the image, such as changing it from RGB to grayscale, is done at this phase.
[3] Image segmentation
The pre-processed and taken image is segmented in this step. The height, breadth, and size of the rectangular box to be formed are the coordinates that are used to create the rectangle box that will be used to trace the image. The size utilized is 20x20, which is more than enough to trace the affected area.
[4] Feature extraction
To construct a database of healthy and damaged leaves, the photos have been downloaded. In order to train them, a harassed file is used, which creates a file containing the threshold values for the photos in the database. This threshold value illustrates the values for a sick leaf and aids in the disease's detection. The values of the input image are compared to the threshold values throughout the image capture and processing, and the result is displayed as a result of the comparison.
[5] Classification.
On the image, illness detection is carried out at this step. if a picture is diseased or not, and if it had bacterial or fungal disease, is determined by the outcome.

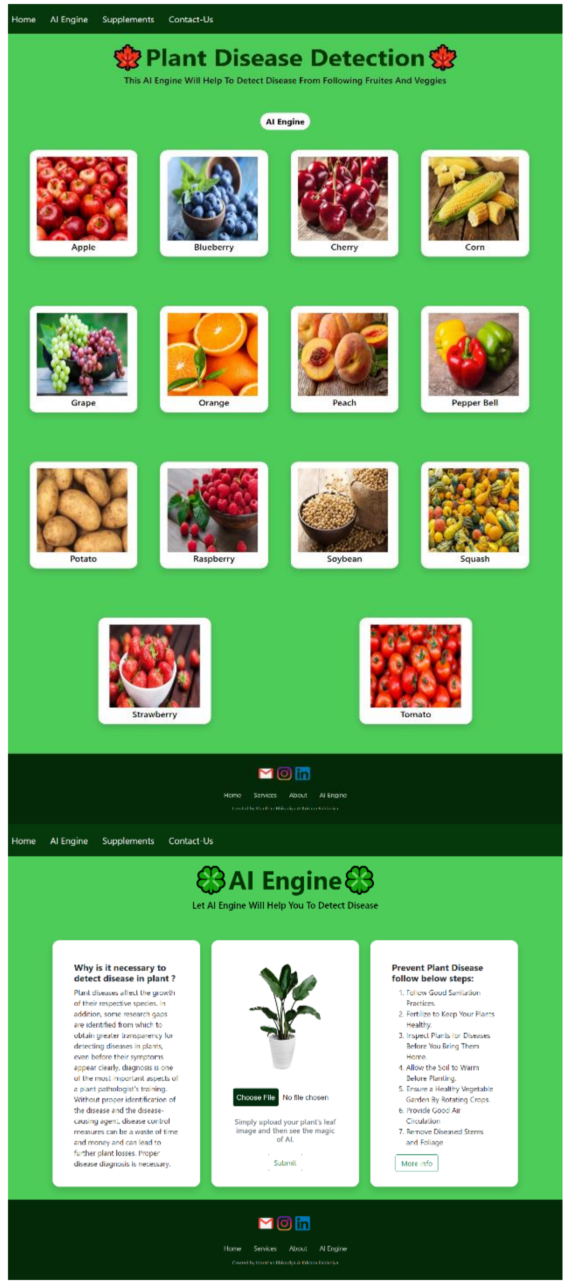
4. Building the model

We'll be using the Sequential model type. The simplest technique to build a model in Kera's is sequential. You can use it to create models' layer by layer. Every layer contains weights that match the layer underneath it. In order to add layers to our model, we use the 'add ()' function. Two layers and an output layer will be added. The type of layer is "dense." A typical layer type that works in most circumstances is dense. In a dense layer, every node from the layer before is connected to every node from the layer in front of it. Each of our input layers contains 10 nodes. This amount may also range from hundreds to thousands. Model capacity is increased by increasing the number of nodes in each tier.

5. Training the model

The data will be randomly divided into training and testing groups during the validation split. The validation loss, which represents the mean squared error of our model on the validation set, will be visible to us during training. The validation split will be set to 0.2, which indicates that 20% of the training data we supply for the model will be reserved for evaluating model performance.

6. RESULT



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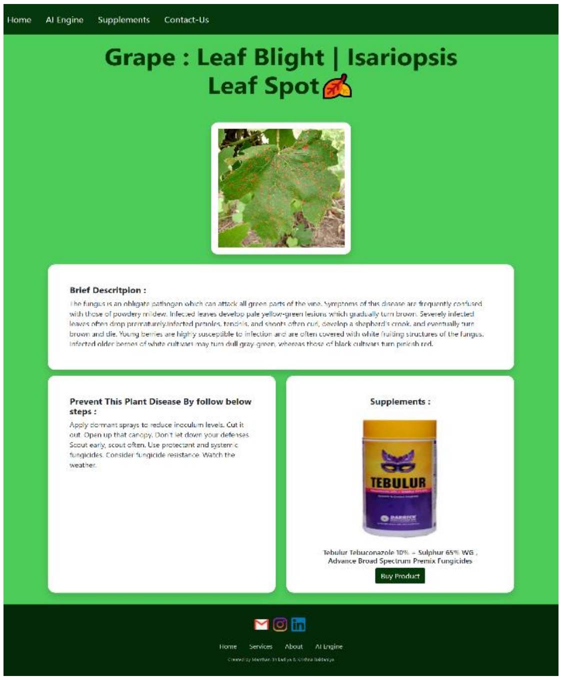

7. CONCLUSION

According to the investigation, processing and using grayscale images is easy. They are more suitable for research than RGB images and have better clarity. These kinds of images will be used to analyses and identify plant diseases, as well as to determine the severity of those diseases as they develop in the plant.

A versatile phone has become widely available, providing notable social and economic benefits.

The goal of this proposal was to develop an intuitive computerized framework for farmers that will aid them in selecting the best locations for take-offs without sending a professional out into the field.

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