PLANT DISEASE DETECTION AND CLASSIFICATION USING MACHINE LEARNING

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ABSTRACT

When plants and crops square measure laid low with microorganism it affects the agricultural production of the nation. Typically farmer or specialists monitor the plants with oculus for searching and identification of malady. However this methodology will be the time process, overpriced and invalid. Automatic identification victimisation image process method offer quick and correct result. The paper cares with a brand new approach to the event of disease identification model, supported classification of the image of leaf, by the utilization of depth convolutional or curved branch. New ones in pc vision gift a chance to expand and improve the observe of precise protection of plant and expand the market of pc vision application within the field of exactitude agriculture. Both the innovative coaching style and the idea or methodology employed make the system execution that comes next quick and simple. The study completely outlines all necessary processes for putting this disease recognition model into practise, from gathering images to create an informational database to having it evaluated by agricultural experts and using a deep learning approach to carry out deep CNN training. This methodology paper may provide a novel method for identifying plant illnesses by using a deep convolutional neural network that has been trained and optimised to accurately match data on a plant's leaves that have been repeatedly collected for various plant diseases.

Keywords: Disease, Training, Neural Network, Tensor Flow, Machine Learning, Identification.

I. INTRODUCTION

India is mostly an agricultural nation. India currently ranks second globally in agricultural output. Today, a brand-new idea of smart farming has been established in which the environmental conditions are managed and tracked by self-contained devices. The ability to recognise one's own illness depends on being able to recognise its symptoms. that farmers, consultants, and researchers can promptly and accurately receive data about the occurrence of illness. This gradually lessens the amount of vast fields that the soul must watch. The key to disease recognition from an image is to determine the diseased region's distinctive characteristics. The possibilities may change depending on the illness. The options that are taken from the image are colour, form, texture, etc. Typically, additional options are extracted for illness detection, and these extracted features would increase hardware costs as well as package costs. The quality and hence the computation time both rise as a result of this. As a result, it is vital to cut back or to pay close attention to feature information. The occurrence of the illness on the plant could result in a crucial loss in every quality as well as the quantity of agricultural output. This could have a detrimental effect on nations whose economies are mostly based on agriculture. Therefore, it is imperative to diagnose a disease in its early stages in order to prevent loss of quality, quantity, and financial resources. The methods that are commonly used for monitoring and controlling plant diseases are manual. Oculus observation is one such important strategy. However, this method requires constant observation of the area by someone with superior knowledge of the plants and their associated diseases. Additionally, hiring this person can turn out to be expensive. Another strategy is to ask a professional for recommendations; however this can increase the cost.

Additionally, a professional must be available when needed to avoid losses. Identifying a plant's illness or a plant's disease may need extensive laboratory tests. However, this method requires adequate lab circumstances, which means it also provides expert data in addition to data that is similar to lab conditions. The

methods for detecting microorganisms will produce more accurate findings. Because the exams require fieldwork, the cost could be exorbitant and the workload overwhelming. This package suggests a technique that could provide more accurate results for the identification and classification of disease and, consequently, the optimum solution for that ailment. It makes an effort to partially replace consultant requirements. Here, the image is first pre-processed and then converted to HSI colour space by using segmentation. From the image, options like axis, minor axis, and eccentricity were extracted. These options are provided to the classifier in the final stage so they can categorise the illness that affected the leaf. Starting with V3, all previous processes have been completed.

II. LITERATURE SURVEY

EXISTING AND PROPOSED SYSTEM: 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. When an earlier sickness appears on a leaf, it should be recognised, detected, and appropriate action should be done to prevent loss. Consequently, a rapid, accurate, and less expensive method needs to be created. To accurately detect and identify illnesses, researchers have developed a variety of ways. One such system makes use of a back propagation network with thresholding. Grape leaf image is used as the input, and inexperienced pixels are hidden using thresholding. Using K-means group divided disease section, the result is achieved.

EXISTING SYSTEM: Previous papers square metric describing the use of several methods to identify plant leaf diseases. In [1], they discussed automatic disease detection and categorization, as square measure given below. sickness marks square measure entirely different in terms of hue but not in terms of intensity. Therefore, a colour redesign of the RGB image is used for better segmentation of disease areas. For picture smoothing, a median filter is used, and the Otsu technique is used to produce threshold values to locate the ill region. For plants in the Magnoliaopsid family, it doesn't give the right answer.

PROPOSED SYSTEM: We used the tensor flow library to construct a system that relies heavily on machine learning and image processing. A suitable machine learning framework might be TensorFlow. TensorFlow can be used anywhere, from training large models across cloud clusters to running local models on embedded systems like your phone. Install the software, often known as the Tensor Flow application, on your computer. You need to install PILLOW and TensorFlow version 1.07 before we can start the tutorial.

If your Python environment is up and running you can install them by using:

```
pip install --upgrade "tensorflow==1.7.*"

pip install PILLOW
```

Follow these instructions if it doesn't work. If you have the primary codelab's scum bag repository. Files produced by the TensorFlow for Poets 1 codelab are used in this codelab. If you still haven't finished the codelab, we advise going to jazz right away. If you choose not to, downloading instructions are provided in the subdivision after this one.

You may also copy the necessary files for this codelab in TensorFlow for Poets 1. Check the branch's contents, confirm that it is your current operating directory, and then do the following:

```
cd tensorflow-for-poets-2

ls
```

There should be three distinct subdirectories in this directory:

• All the files required to develop an easy Python application that uses TensorFlow Lite to categorise images since it reads them from the camera are located in the Python/tensorflow lite directory. The model files can be replaced with your customised versions.

• The Python scripts you will use throughout the tutorial are located in the scripts/ directory. These incorporate scripts to arrange, examine, and evaluate the model.

• The files you should have produced in the first half are located in the tensorflow files/ directory. You should have the following files, which include the retrained TensorFlow programme, at the very least:

III. SYSTEM DESIGN

Application Development: The app's event went through a number of steps, including server creation, picture storage within the information, picture access from the information, data modification into the information, and message extraction from the information. A server was first made by creating an account on Hostinger, entering information, and then creating a table for storing photographs. Later, a php script was created for the purpose of connecting to the server and providing data to the Python application. Three buttons - file selection, image transfer, and message viewing were included in the Python app's layout. A layout containing a text box, a button labelled "Get Message," and a text space to display the message as seen above would be opened by selecting the read message button several times.

Creation of Server: Making a server is the first and most important operation, which may be accomplished by creating an account. In PHPMyAdmin, pertinent data is created. The table "photos" is afterwards formed with two columns, one of which is ID and the other is "image," which is a BLOB type. As soon as a picture is posted, it gets added to this table. In order to store values into the table when processing an image, a second table called a message table is also established.

Uploading Image: When the farmer selects the option for File Choice, a folder opens, allowing him to choose an image from it. The image is displayed after selection. The farmer will click on transfer picture choice after selecting the appropriate image, which will then be presented within the app. The image is saved inside the data after being uploaded to the server. The farmer received an associate ID and a message stating that the uploaded photograph was successful.

Image Processing: The use of computer algorithms to achieve image processing on digital images is known as digital image processing. It enables the application of a much larger range of algorithms to the input file and may prevent difficulties like the accumulation of interference & signal distortion throughout the process. Digital image processing could also be modelled in the manner of [multidimensional systems] because pictures are typically drawn in at least two dimensions, if not more.

Through the use of another php script called Get Image, the image cannot be inherited from the server. Getting access to the photograph is in doubt. PYTHON may access the picture by using the server's php application's global resource locator. The button labelled "Image select" is part of the Python user interface. When you select an image, the server immediately downloads it. The regardless image is pre-processed so that any use can be made of it.

The procedures for spotting illness in crops are as follows:

- Image Pre-processing
- Segmentation
- Extraction of Features
- Classification

Image Pre-processing: The image has undergone pre-processing. The RGB image is first converted to a L*a*b* colour space as part of the pre-processing. Brightening level tier L*, Chroma city layer a*, and Chroma city layer b* make up the L*a*b* colour space. The levels a* and b* include all the colour data. In order to convert the RGB-colour image to a L*a*b* region, it requires kind to construct colour form. The function make form() is used, and after that, the structure is added to the nonheritable image.

Segmentation: There are several segmentation algorithms in use, but k-means clustering is one of the most useful techniques for disease identification. K-means cluster is a vector quantization approach popular for data sets in data processing. It was originally developed for the signal processing industry. K-means clustering seeks to divide n observation into k clusters, each of which serves as a paradigm for the cluster and in which each process determines to the group with the closest mean. As a result, the information region is divided up into Voronoi cells. While the expectation and maximisation mechanisms allow the clusters to fully own in various shapes, respectively, the k-means clusters tends to seek out clusters of comparable spatial extent.

Feature Extraction: The selected cluster's options are extracted. Since the chosen picture is in RGB format, it is converted to grey scale. The grey - level Co-occurrence Matrices appear in the next phase (GLCM). Grey level co-occurrence matrices are used to get the desired statistics (GLCM). the following thirteen options: contrast, correlation, energy, homogeneity, mean, variance, entropy, and RMS are extracted and analysed. Smoothness, kurtosis, skewness, and variation The Associate in nursing collection retains the 13 options.

Classification: The idea of boundary-defining call planes was backed by support vector machines. A selection plane is one that distinguishes between collections of items with utterly unrelated category memberships.

IV. RESULT AND DISCUSSION

In this section we discuss about the working of the system or application. Following are the special features of the system –
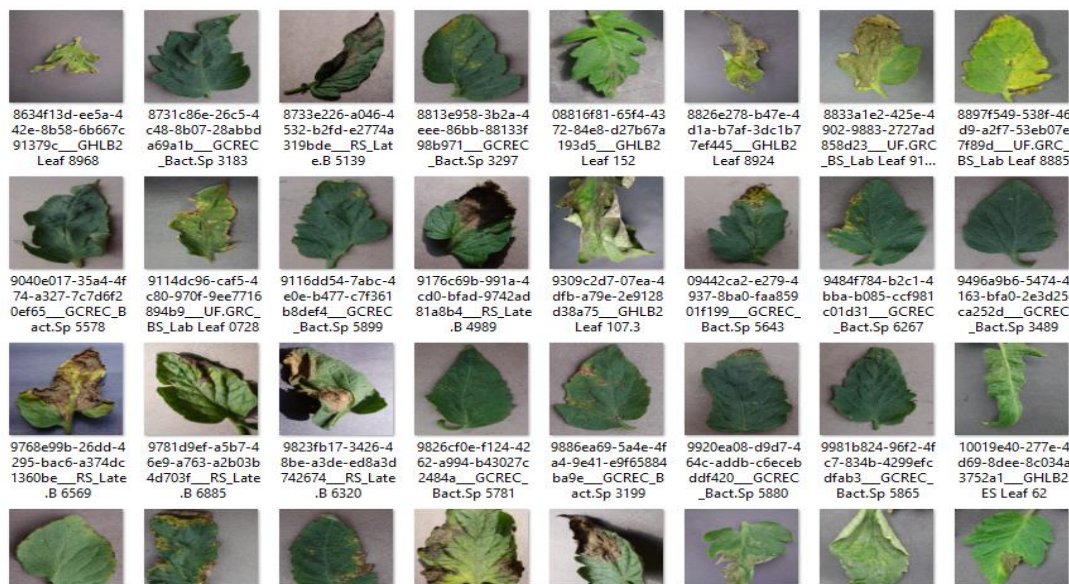
Data Set Sample:

Figure 1: Data Set

These are the pictures of data set which is used to identify the disease and to train the machine for the detection purpose.
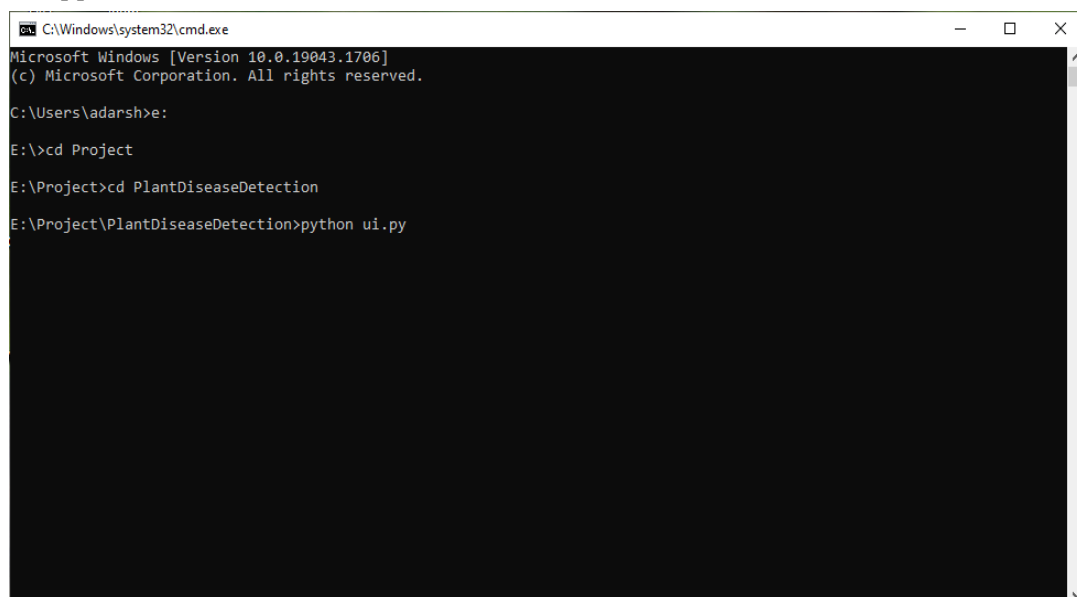
To run the application:

Figure 2: Command prompt to run the application

To run the Application we have to open the command prompt and we go the path where the application is present and then give the command "python ui.py"

Starting of the Application:

Figure 3: UI of the Application

It is the user interface (UI) of the application where we add the sample photograph of the plant leaf to detect the disease.

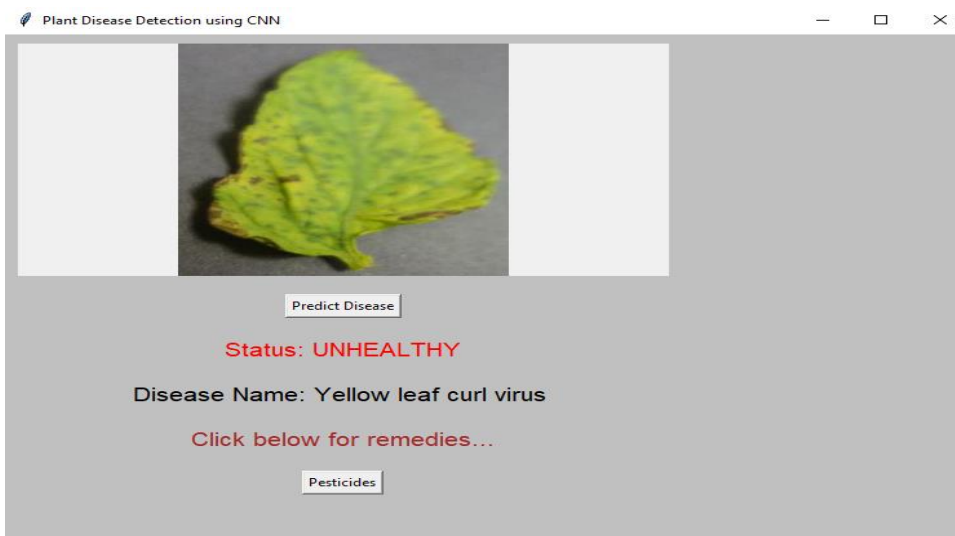**Add the sample and predict the disease:**

Figure 4: Add and predict the disease

After clicking "Predict Disease" button the result of the plant leaf is shown. It shows the disease name, healthy or unhealthy. If the user clicks the "pesticides" button it also shows the precaution measures.

V.   CONCLUSION

The results presented in this section are related to coaching, with all the data including both the original and enhanced images. Results obtained when convolutional networks were taught with only original images won't be examined because it is believed that these networks can discover new options after being trained on larger datasets. As soon as the network's parameters were adjusted, an overall accuracy of 96.77 per cent was attained. Additionally, each category was examined separately using the trained model. Each picture from the validation data was checked. Findings that were attained should be compared to other results under the guidance of reasonable application standards. Additionally, other from those managing plant species recognition backed by leaf images, there are presently no commercially available solutions. In this paper, a method for using deep learning to automatically identify and classify diseases in plants from leaf images was investigated. The entire process was broken down into distinct steps, starting with grouping the images used

for teaching and validation, moving on to picture pre-processing and augmentation, and concluding with teaching using deep CNN and fine-tuning. To imagine how the newly developed model might perform, entirely new tests were run. There was no comparisons with related outcomes using the exact technique because, as far as we all know, the imparted methodology has not been used in the domain of disease recognition.

VI.   REFERENCE

[1]   Aakanksha Rastogi, Ritika Arora, Shanu Sharma, "Leaf Disease Detection and Grading using Computer Vision Technology &Fuzzy Logic," presented at the 2nd International Conference on Signal Processing and Integrated Networks (SPIN), IEEE, 2015, pp. 500–505.

[2]   S. Arivazhagan, R. Newlin Shebiah, S. Ananthi, S. Vishnu Varthini, "Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features," Agric Eng Int CIGR J., vol. 15, no. 1, pp. 211–217, Mar. 2013.

[3]   K. Muthukannan, P. Latha, R. PonSelvi and P. Nisha, "CLASSIFICATION OF DISEASED PLANT LEAVES USING NEURAL NETWORK ALGORITHMS," ARPN J. Eng. Appl. Sci., vol. 10, no. 4, pp. 1913–1918, Mar. 2015.

[4]   Hrishikesh Kanjalkar P. and Prof. Lokhande S. 2013. Detection and Classification of Plant Leaf Diseases using ANN. International Journal of Scientific & Engineering Research. ISSN: 2229 5518.

[5]   Suhaili Beeran kutty. and Noor ezan Abdullah. 2013. 'Classification of Watermelon Leaf Diseases Using Neural Network Analysis', IEEE Business Engineering and Industrial Applications Colloquium (BEIAC). International Journal of Engineering Science and Computing, March 2017 5328 http://ijesc.org/