Plant Disease Detection Using Image Processing

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Abstract **- The economy of the country depends on the productivity of the agricultural sector. In India, it is a civilized country, and about 70% of the population is dependent on agriculture. Farmers have a wide range of diversity to select from a variety of suitable crops, and the search for a suitable pesticide for your plants. Any damage to the installation due to disease, leads to a significant decrease in both the quantity and quality of agricultural products. The identification of the plant diseases is the key to preventing the loss of productivity and the improvement of the quality of the products. The traditional methods are reliable but require human resources for the visual observation of the plant's leaves, patterns, and disease diagnosis. The study of plant means to study the observable trends in the plant. The Monitoring of the health of the plants, and the diagnosis of the disease is of great significance for sustainable agriculture. It is very difficult to control the growth of the plants by hand. It takes a tremendous amount of work and research in the plant, and it requires excessive processing time. Hence, image processing is used for the detection of plant pathogens. Diagnosis of the disease involves the steps like image acquisition, data processing, image segmentation, feature extraction, and classification.**

Index Terms **- Image Processing, Image acquisition, Segmentation, Feature-extraction.**

I.INTRODUCTION

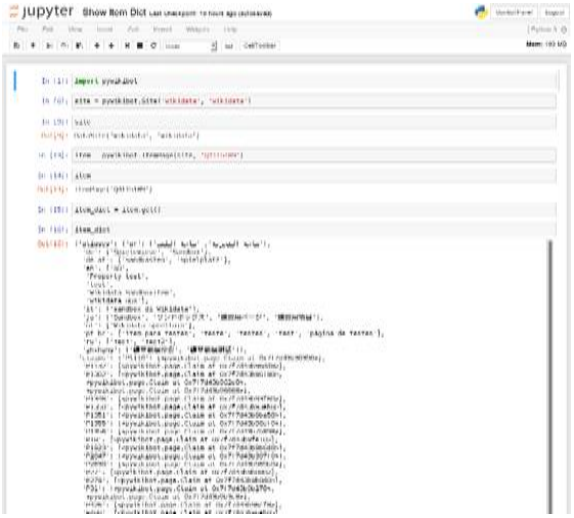
In India, it is a civilized country, and about 70% of the population is dependent on agriculture. Farmers have a wide range of diversity to select from a variety of suitable crops, and the search for a suitable pesticide for your plants. Plant diseases cause a significant reduction in both the quantity and quality of agricultural products. Plant disease survey refers to the studies of visually observable structures in plants and animals. The Monitoring of the health of the plant and the disease will play a key role in the success of the cultivation of the plants on the farm. Due to the changes in environmental conditions, such as rain, the soil, the temperature, the plants can be infected by fungi, bacteria, and viruses. They can use them with the proper application of pesticides and herbicides for plants and to prevent disease and improve the performance of the product and its quality. A Plant of the field of vision of control schemes are used for identification and studies of plant diseases. The detection of plant diseases is, in the first phase of the project will be helpful since the disease can be controlled. In the early days, the plant has been recorded and analyzed manually by an expert in the field. It takes a lot of work, and also does not require an excessive processing time. Image processing techniques can be used for the detection of plant pathogens. A small, pale green spots appear on the and it is spread out on the table. The affected area is it is in a dry place. Leaf samples are fed to the image processing system for the infection/disease identification. The various steps in relation to plant disease detection, including image acquisition, preprocessing, segmentation, feature extraction, and classification.

II. HARDWARE AND SOFTWARE REQUIREMENTS

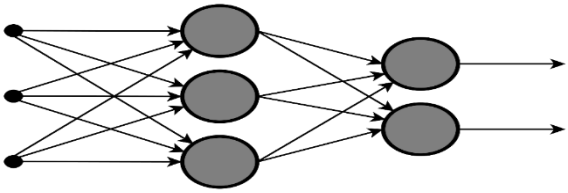
Windows 10: Windows 10 is the latest version of its Windows NT-based operating system developed by Microsoft. It is the successor to Windows 8.1, which was released nearly two years ago, and it was released to manufacturing on July 15, 2015, as well as to be widely available to the public on July 29, 2015. Windows 10 has been made available for download by MSDN and Technet as a free upgrade for retail copies of Windows 8, and Windows 8.1 users via the

Windows Store, as well as, for users of Windows 7, the Windows update web site.

Jupyter Notebook: Jupyter is a a free and open-source, interactive web-tool, that is well-known as a computational notebook, which the researchers are able to use for the connection to the code of the computational output of the descriptive text and multimedia in a single document. Computer and laptop computers, and have been for a few years now, but in Jupyter, in particular, has exploded in popularity over the past few years.



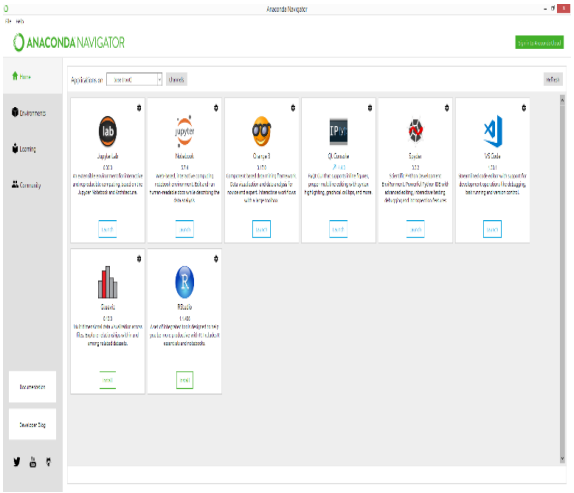
Keras: Keras is an open-source software library that provides a Python interface for artificial neural networks. Keras works as an interface to the TensorFlow library. Prior to version 2.3, Keras supports many different backends, including TensorFlow, Microsoft Cognitive Toolkit, Theano, and PlaidML. Starting with version 2.4, only TensorFlow is supported as well. Designed for fast experimentation with deep neural networks, it focuses on the usability, flexibility, and expandability for the future. It has been developed as part of the investigation, the ONEIROS (Open-ended System of Intelligent Electronic Robot Operating System), and is the main author and a lawyer, Francois Schollet, a Google engineer. Scholle is also the author of the deep neural network, XCeption model.



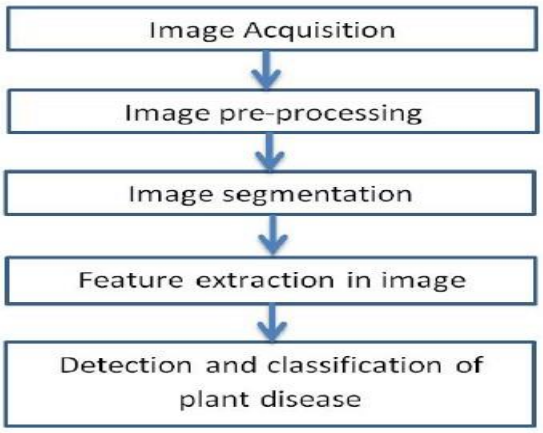
TensorFlow: TensorFlow is a free and open-source software library for machine learning. It can be used in a variety of tasks, but it is of particular importance for the progress of science and the output of a deep neural network. Tensorflow is a free mathematical library, based on the flow of data to and differentiable programming. It may be used for research and production at Google. TensorFlow was developed by the Google Brain team for internal use by Google as well. It is released under the Apache 2.0 license in 2015.

Pillow: The Python Imaging Library) is a free and open-source extension library for the Python programming language that adds support for opening, manipulating, and saving in different formats. It is available for Windows, Mac OS X, and Linux. The latest version of PIL is 1.1.7, was released in September 2009 and supports Python 1.5.2-2.7. The design of a project-known as the birth control PILL and was completed in 2011.[2] Later, in a common project called the Pillow is bifurcated on the PILL store and it adds support for Python 3.

Anaconda: Anaconda is a distribution of the Python and R programming languages for scientific computing (data science, machine learning applications, large-scale data processing, predictive analytics, etc.) aimed at simplifying package management and implementation. The distribution includes data-science packages suitable for Windows, Linux and mac os. It is developed and maintained by Anaconda, Inc.", that is, it was created by Peter Wang, and Projects, Instagram, in 2012.



basic step for disease detection



Basic steps for plant disease detection and classification

Image Acquisition: The overall purpose of the image collection to transform an optical image of real-world data into an array of numeric data, which can then be processed on a computer before using an image-processing will begin, and a video or photo to grab the camera and turned it to the control of thecompany.

a b c

Image Pre-processing: Several preprocessing methods are described for eliminating picture failure or delete an object. To crop the image, i.e. the crop, the leaf, the image of the desired part of the image. The image is softened with the aid of a voice. You can use it to improve the quality and to increase the contrast.

Image Segmentation: Image segmentation is a method of dividing an image into several subimages. Here, we use the K-mean segmentation method, which makes use of a color-estimation method is to split up and merge video clips. Because of the green colour of the leaves, it is normal, and we do not treat them. Please select the cluster image show the area to be taken, and the object is to be loaded.

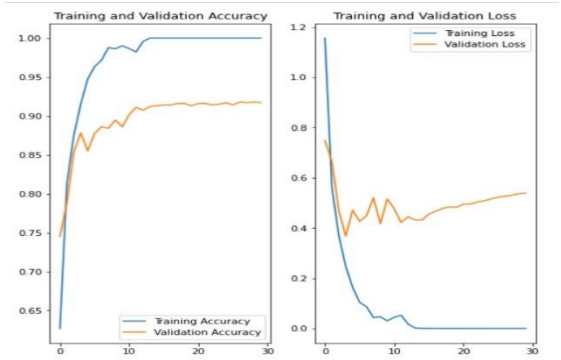
Feature Extraction: The focus features will play an important role in the identification of an object. A lot of photo editing programs to use to symptom removal. The color, the texture, the form, the edges, and so on are the tools that can be used when a plant disease to be detected.

Classification: The leaves are affected by diseases caused by fungi, bacteria, and viruses. Sometimes the insect damage to the leaves, which manifests itself as a leaf spot disease. The contaminated portion of the sheet will vary in size and color depending on the stage of the organism. The points will be shown in a variety of colors, including yellow, black, brown, tan, and black. Based on the information of the GLCM to classify the disease. Here, we have to consider this disease as Instagram, Leaf Spot bacterial ones.

result analysis

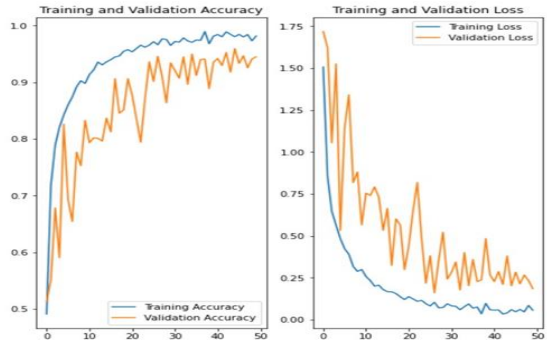
This image most likely belongs to Tomato_Healthy with a 99.97 percent confidence.

This image most likely belongs to Tomato_Early_Blight with a 87.77 percent confidence.



As you can see from the plots, training accuracy and validation accuracy are off by large margin and the model has achieved only around 60% accuracy on the validation set.

Let's look at what went wrong and try to increase the overall performance of the model.



After applying data augmentation and Dropout, there is less overfitting than before, and training and validation accuracy are closer aligned.

V.CONCLUSION

The accurate detection and classification of plant diseases is very important for the successful cultivation of the crop, and this can be done with the help of image processing.

This work provides an efficient and accurate method for the detection and classification of plant diseases using image processing techniques. For the detection of the disease on the leaves of the plant, the K-means, and the GLCM method is used. This is an automated system to reduce the exploration and the exploitation of the time.

VI.ACKNOWLEDGEMENT

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