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LEVERAGING ARTIFICIAL INTELLIGENCE FOR EARLY DETECTION OF PLANT DISEASES

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ABSTRACT

We are all aware that India is the most important agricultural country in the world. A wide variety of crops are grown there, and frequently, these crops are destroyed by diseases that settle on the leaves of the plants. To address this problem, we have proposed a model that will detect diseases on the leaves of plants and spray the necessary medication for them.

INTRODUCTION

India's agriculture is very big, so many crops are grown in different parts of the country. However, in recent years, the number of diseases and the damage they cause have increased, mostly because cultivation methods have changed, pathogen varieties have changed, and plant protection measures need to be more effective. This study aims to develop a deep convolutional network model for rapid and precise automated detection using sorghum (Jowar) and cotton leaf disease images. The five most common leaf diseases are leaf blight, dark stripe, leaf rust and grey leaf spot, bacterial leaf spot, and zonate leaf spot. The signs and symptoms of these leaf diseases vary. Professional plant pathologists may be better at spotting diseases than inexperienced farmers. An automatic system designed to identify crop diseases based on the crop's appearance and visual symptoms could greatly assist farmers as a verification system in disease detection. It has taken a lot of work to quickly and accurately identify leaf diseases. Leaf diseases can be identified and categorized using neural networks and digital image processing methods. The field of deep learning has come a long way in recent years. It can now use many input images to extract useful feature representations. Deep learning gives detectors a chance to quickly and accurately identify crop diseases. This will not only make plant protection more accurate, but it will also make computer vision more useful in precision agriculture.

BLOCK DIAGRAM

The detailed workflow diagram for the proposed system is depicted in the image below. In this case, the leaf image serves as the initial input, and further pre-processing is performed on that image. The image's pre-processing consists of fundamental steps like converting RGB to grey, detecting edges, etc. After that, the same image is subjected to feature extraction. Then, based on the machine learning algorithm, normal and abnormal images are classified and detected, and abnormal images are identified according to predefined diseases. We have a data set of images in this system, of which 20% are used for testing, and 80% are used for training.

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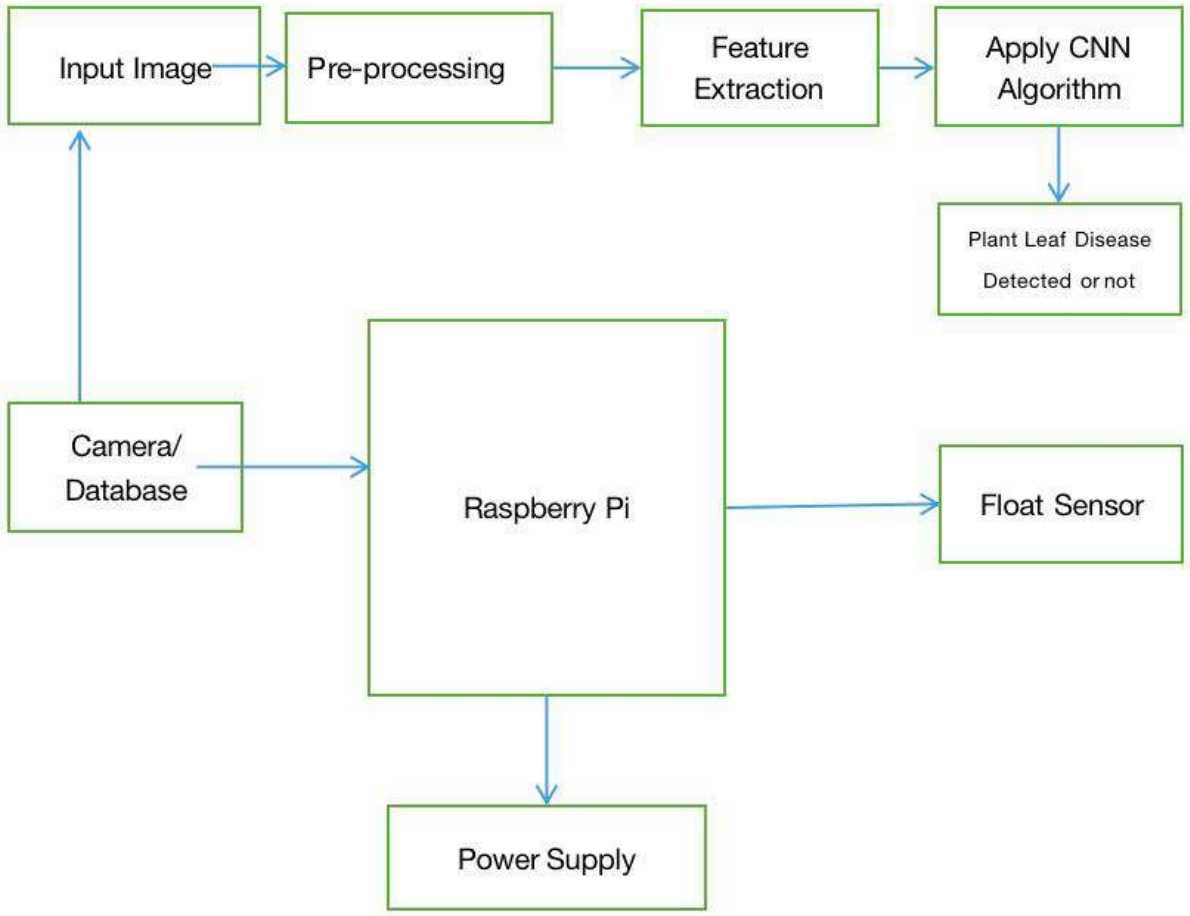


The information we have gathered is based on the plant diseases that occur in particular plants, most of which are grown in India. In this project, we will investigate a variety of plant species.

The following diseases will be identified using this model: leaf blight

A. Image pre-processing

The purpose of image pre-processing is to ensure that the image has been processed and that any distortion or unclear areas have been resolved.

B. Feature Extraction

Feature extraction builds derive features from a starting set of primary data to be informative and non-redundant, easing the learning and generalization steps that follow and, in some instances, improving human interpretation. The leaf's feature extraction technique is used to identify the diseased and fertile portions of the leaf.

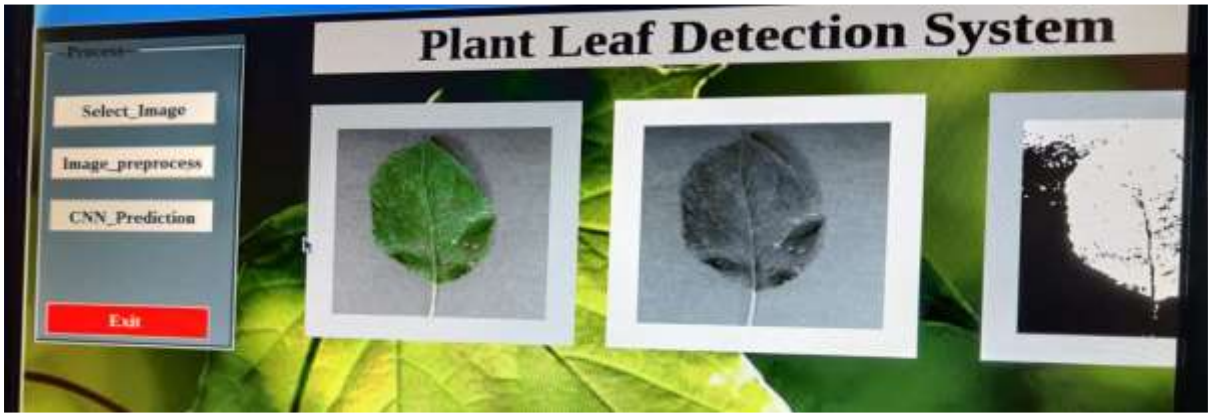
Ex. The leaf's feature extraction method works in such a way that it identifies disease-affected regions. It will use grey to mark the spots that are supposed to be fertilized.

C. Image Processing

Image processing is a very important area of application in which algorithms are used to find and isolate various parts.

EXPERIMENTAL RESULT

The proposed system produced the following outcomes:



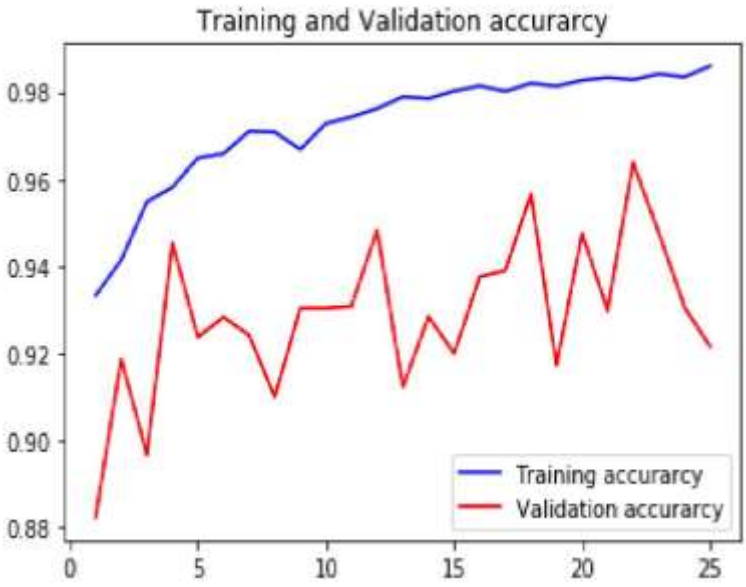
A grayscale image is one in which each pixel's value is a single sample that only conveys information about the intensity of light. Grayscale images consist solely of shades of grey, black-and-white or grey monochrome. The contrast is strongest between white and black at the lowest intensity. We used a database of about 16 plant leaves to identify the images.

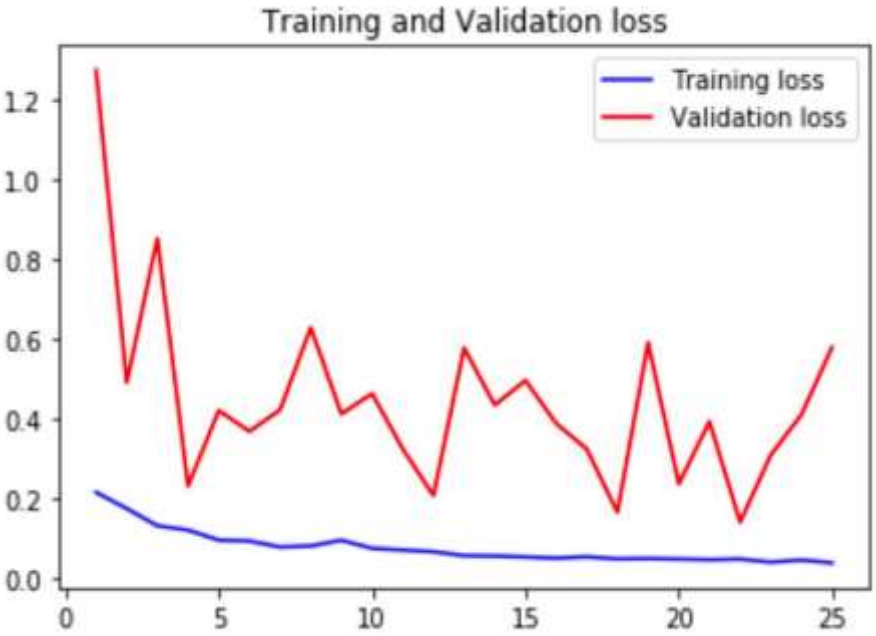
The most crucial task is image segmentation in many image processing systems, such as pattern recognition, image retrieval, and small surveillance. Through the identification of regions of interest, the result of segmentation is primarily utilized for image content comprehension and visual object recognition. Lines, curves, and other boundaries can be found using image segmentation. in images, give each pixel in an image a label so that pixels with the same label have similar visual properties.

Additionally, image segmentation produces a collection of regions that collectively encompass the entire image. In these regions, each pixel is identical in terms of a computed property or characteristic, such as colour, intensity, or texture. We have attached a few images that demonstrate the operation of our project.

After extracting the image of the given leaves, the output of how the disease and the plant species are identified can be seen in the images below.

COMPARISON BETWEEN OLD MODELS AND NEW MODEL





CONCLUSIONS

The algorithm we used enables us to accurately process the extracted features and effectively identify the disease on the leaves that reduces crop growth.

1) Creating a completely automated system that uses remote sensing methods to acquire spectral images from airborne images from chartered or model planes and satellite imagery.

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