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Plant Disease Identification

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A B S T R A C T

Detection of plant leaves is an important factor in preventing serious outbreaks. Automated plant disease detection is an important research topic. Plant commitment is essential to human life and condition. Plants suffer the same adverse effects from disease as humans and animals. There are a number of plant diseases that affect the normal growth of plants. This disease affects plants such as leaves, stems, organic matter, roots and flowers. Instead of dealing with plant diseases, they often bite the dust or cause the leaves to fall, bloom, and lose organic matter, etc. can cause Accurate identification of such diseases and correct identification of such diseases are essential for plant disease management. Plant pathology is the study of plant diseases, their causes, and methods of controlling them. However, current strategies involve humans to distinguish between disciplines and disease evidence. This strategy is tedious and expensive. Programmatic classification of diseases from plant leaf images using a precision registration approach may be more valuable than the current situation. In this work, a strategy called convolutional neural network based on bacterial detection is used to identify and characterize plant leaf diseases. To do ideal weighting in CNN. Using a bacterial detection method (BFO) that extends the speed and accuracy of the system to identify and classify different infections in plant leaves. Advanced computing expands the efficiency of the system by seeding and harvesting and has consistent features to optimize the mining process. Control parasitic diseases such as main rust, cedar rust, late blight, leaf curl, leaf spot and early blight. The proposed strategy achieves greater accuracy in infection detection and characterization.

Keywords: Plant disease identification, Data science, Image processing, CNN .

1. Introduction

Image Processing

Image processing is the process of converting an image into digital form and performing some operations on it to obtain an improved image or extract useful information from it. An input, such as a video or photo frame, is a form of signal distribution that may contain an image or attributes associated with that image. Typically, image processing systems involve processing images as two-dimensional signals using predetermined signal processing techniques.

Purpose of image processing

The purpose of image processing is divided into 5 groups. They are:

1. Visualization - Observing the invisible.

2. Sharpening and image restoration - To create a better image.

3. Image Search - Search for images of interest.

4. Scale Pattern - Measure different objects in the image.

5. Image Recognition - Differentiate objects in images.

Types

Two types of image processing techniques are Analog and Digital image processing. Analog or visual image processing techniques can be used for hard samples such as prints and photographs. Image analysts use a different interpretive framework when using these visual techniques. Image processing is limited not only by the limits for learning, but also by the knowledge of the analyst. Association is an important tool in image processing through visual methods. Therefore, the analyst uses a combination of personal knowledge and collateral information to process the image.

Digital processing techniques help manipulate digital images using a computer. The raw data from the imaging sensors on the satellite platform contains defects. To overcome such defects and obtain the originality of the data, it must go through several stages of processing. Three common stages that all types of data must go through when using digital technology are preprocessing, enhancement and display, and data extraction.Information Patterns, associations, or relationships between these data can provide information. For example, a point-of-sale analysis of a retail store can provide information about what products are sold and when.

Plant disease prediction

India is agricultural. Farmers have a variety of fruit and vegetable crops to choose from. Research efforts develop a predictive system for disease detection using infected images of various leaf spots. The image captured by a mobile digital camera and processed by image development, then part of the leaf sport is used for the purpose of train classification and test. Advanced techniques in the system include Image Processing and Advanced Computing Techniques.

Various types of leaf spot disease

Most foliar diseases are caused by fungi, bacteria and viruses. Fungi are identified from their morphology, focusing mainly on their reproductive structures. Bacteria are considered simpler than fungi and usually have a simple life cycle. With some exceptions, bacteria exist as single cells and multiply their number by dividing into two cells in a process known as binary fission. Viruses are very small particles made up of protein-linked non-protein genetic material [9]. In the biological sciences, thousands of images are sometimes produced in a single experiment. Classification of lesions, determination of quantitative characteristics, calculation of insect feeding sites, etc. images may be necessary for additional tests such as Not only is this a big task, but also suffers from two main problems: too much processing time and subjectivity from different people. Therefore, to perform high throughput testing, plant biologists need efficient computer software to automatically extract and analyze important content. Image processing plays an important role here. This project provides an image processing technique used to detect leaf lesions.

2. Literature survey

2.1 PLANT SPECIES IDENTIFICATION USING ELLIPTIC FOURIER LEAF SHAPE ANALYSIS

AUTHOR: JOÃO CAMARGO NETO

Plant species can be accurately identified using Elliptic Fourier leaf shape features extracted from the plant canopy. EF method combined with principal component analysis and linear discriminant model performed very well. Third week-old plants had more developed leaves and provided the best leaf images for plant species identification, with a classification rate of 88.3%. As the leaves grow, their shape becomes an important trademark. The reconstituted pork plant has a well-defined minimum in two weeks. Redroot Soybeans can be distinguished from Soybeans during the third week due to the round shape of the leaves, similar to trifoliolate soybean leaves during this stage of growth. Less misinformation also happens with perpetrators. By combining the images of leaves in the second and third week, about 88.4% accuracy of identification of this type was obtained. Future EF studies should consider increased time, backlighting, improved camera performance, and training to detect additional leaves. Leaf orientation is important in EF analysis. To our knowledge, this has not been addressed in previous plant species imaging studies. Two angles are needed to describe a leaf plane in three-dimensional space. It is difficult to control or adapt to one of the leaf angles, but many species can point sunlit leaves towards the heliotropic light source, thus choosing the best camera angle for full leaf exposure at the top of the leaf. The leaf angle in the cavity plane is concerned with the first EF harmonic, which is an important angle for spiral leaf structure or vein analysis. Additional research on leaf orientation relative to the camera lens may help resolve this issueclassification error. Future research is also needed to determine the minimum amount of digital imaging required to maintain the highest level of species discrimination.

2.2 FIRST STEPS TOWARDS AN ELECTRONIC FIELD MANUAL FOR PLANTS

AUTHOR: GAURAV AGARWAL

This paper aims to create a prototype electronic field guide for plant species represented in the Smithsonian collection at the National Herbarium of the United States (USA). We considered three main components in creating this field guide. First, we built a digital library that recorded image and text information about each specimen. Initially, we focused our efforts on type specimens (about 85,000 vascular plant specimens in the United States) because they are important collections and clearly define the species. We envision that this digitized collection at the Smithsonian may soon be merged and linked with digitized specimen collections at other major world herbaria, such as the New York Botanical Garden, Missouri Botanical Garden, and Harvard University Herbaria. However, we soon realized that in many cases, species samples are not the best representative of species variation, so we expanded our non-species collection to develop our image library. Second, we develop a plant recognition algorithm to compare and rank visual similarity in recorded images of plant species. types and will be combined with traditional search strategies in the text section of the digital collection. Third, we developed a set of prototype devices and mobile user interfaces for use in testing and in the field. In this paper, we describe our progress in creating a digital collection of Smithsonian-type specimens, developing recognition algorithms that can match leaf shapes to native plant species, and developing user interfaces for electronic field guides.

3. Existing System

Precision Botany (PB) refers to the use of new technologies in plant identification. Computer vision can be used in PB to distinguish plants from the species level, so that definitions can be applied to the size and number of plants detected for classification purposes. Automatic plant identification functions have gained new popularity due to their use in quickly characterizing plant species without requiring the expertise of botanists. Due to the later seasonal nature and abundance of leaves (except in winter), leaf-based features extend to flowers, fruits, etc. Today's electronic photography equipment is designed to make little or no difference between the target and its digital counterpart. The success of machine learning for image recognition also suggests applications for plant identification from herbarium specimens. Once an image of the target has been digitally captured, a number of image processing algorithms can be used to extract features from it. The use of each of these features will depend on the specific pattern to be displayed. Computer-aided automatic classification of plants has received more attention recently. Identifying plant species with unknown history requires advice from a cumbersome field guide, where the user must observe the sometimes-vague characteristics of the plant and navigate a complex decision tree. This practice is not essential even for experienced botanists, and it is often impractical to take a guide into the field - especially for climbers and other casual users. The emergence of highly portable, computationally powerful smartphones with large storage capacity allows not only to replace and improve the database guidance field and decision tree functions, but also to create special image-based leaf classification applications. processing method is now a standard platform.

Feature Extraction

Leaf shape feature

Shape features generally consist of a set of parameters that describe a specific shape according to some basic geometric properties. Properties often used to describe specific shapes are, for example, aspect ratio, squareness, rotation, solidity, and compactness. and convection. Nomenclature can vary considerably, but the general definition of this measure is very consistent and can be found in any introductory book on image processing, for example [12]. Shape features are used intensively in image processing and are not needed in the context of classification. One of the most interesting aspects of image analysis using shape features is that the method is very intuitive, meaning that image features are easy to understand when they identify basic geometric properties that match human perception. Although the calculation process for some features of the previously mentioned image is not complete, the reader can easily guess what is meant by examples with feature names such as rectangles.

Leaf texture analysis

Leaf texture analysis is the application of general image texture analysis techniques for leaf images in the plant classification system. It can be used if the texture shows consistent properties in a given species, and especially when used in conjunction with other methods of leaf analysis, such as leaf imaging techniques. Some authors have reported good results from incorporating the network analysis method into the leaf classification system, but given the varying size of the database used and the nature of the method used, there are no consistent conclusions about the quality of this approach.

4. System Architecture

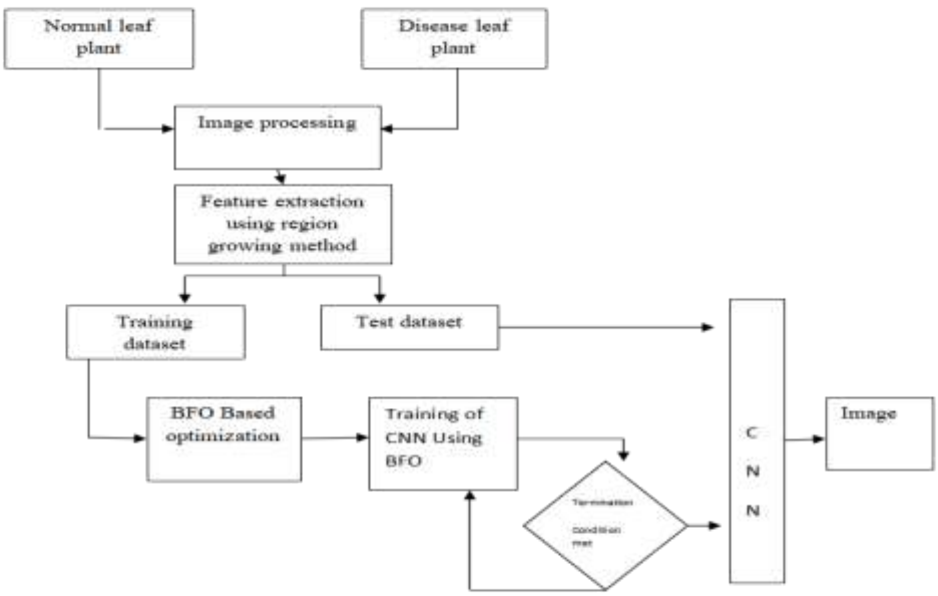

Fig. Architecture diagram

5. Proposed System

Plant disease has become a major problem because it can cause a significant reduction in the quality and quantity of agricultural products. In the proposed work, we distinguish between plant disease detection and characterization using several computational learning approaches. The proposed strategy uses a trained CNN to locate areas affected by various plant diseases using bacterial forage optimization (BFO). RBFNN is an excellent direct algorithm with the ability to monotonically increase or decrease with de-centering to take care of the multidimensional nature of the effective area in plant leaf images. The performance of the Radial Basis Function Nervous System is further enhanced by using a strategy to grow a region of comparable nature that focuses on hunting and extraction centers. With its simulation capabilities and multi-ideal capability, BFO proves to be a productive and efficient tool to increase CNN weights and train an accurate system that can distinguish different regions in plant leaf images with high fusion speed and accuracy.

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Conclusion

Plants are a basic need for all living things. They are the most important and integral part of our environment. Like humans or other living organisms, plants also suffer from various diseases. Such diseases affect the growth of plants, flowers, fruits and leaves etc. harmful to plants in many ways that can affect their growth. Therefore, in this work, we propose a new method called Convolutional Neural Network (CNN) based on the optimization of bacterial herbivory to detect and classify plant leaf diseases. The results show that the proposed method achieves higher performance in terms of identifying and classifying plant leaf diseases compared to other methods.

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