Deep Learning and Artificial Neural Network Methodology for Recognition and Identification of Plant

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Abstract— Plant segregation and crop identification help people to better understand and protect plants. The leaves of plants are the important parts of recognition. With the development of technological intelligence and mechanical detection technology, plant leaf recognition technology based on image analysis is used to improve plant integration knowledge and protection. In-depth learning is a summary of the in-depth neural network learning process and belongs to the structure of the neural network. It can learn features from big data and use an artificial neural network based on a back distribution algorithm to train and separate plant leaf samples. Contents of this paper extract the characteristics of plant leaves and identify plant species according to image analysis. First, images of plant leaves are categorized in different ways, and then an extraction algorithm is used to extract the leaf formations and texture characteristics in the leaf sample images. After that, the complete feature details of the plant leaves are compiled according to the full data. At the same time, comparing the leaves of 7 different plants found that ginkgo leaves were easy to spot. With photos of the leaves under a complex background, a good visual effect was obtained. Image samples of the test set are included in the learning model to detect reconstruction errors. The class label of the test set can be obtained by redesigning the deep learning model with the smallest error set.

Keywords: Plant Identification, Leaf Fragmentation, Feature Extraction, Neural Art Network, In-Depth Study

I. INTRODUCTION

There are many natural resources in the world, and plants are an important part of natural resources. Plants are also known as green plants, including seed plants (angiosperms, gymnosperms), moss, and vintage plants, including ower energetic plants, mossy, vines, grasses, and so on. Plants are important for humans: photosynthetic synthetic starch provides human food; absorbs carbon dioxide to combine oxygen; regulates natural temperature and humidity; absorbs toxic gases to purify the air. It is thought that there are hundreds of thousands of plants present. They have different shapes, structures, and ways of life In order to better understand and use plants, plants need to be integrated.

Plant tax has various forms of classification, such as plant cell production, genetic engineering, serum plantation, and chemical synthesis. For many people who do not work in research, it is difficult to find some ingenuity, difficulty in using it, and poor performance. Traditional methods of crop classification and identity require that the identity be rich in tax information and long-term practical experience and that we take the corresponding key to complete the integration successfully. And the above planning methods depend on the actual availability of a large amount of data required, leading to a strong tendency for this data, including low staff performance, heavy workload, consideration, and accuracy of the results of the monitoring are affected. With the rapid development of computer pattern recognition technology, it is possible to solve these problems by relying on computer imagery and pattern detection technology. Therefore, it is one of the possible ways to identify plants quickly and accurately with a computer. Also, the analysis and acceptance of digital images based on digital photography are critical to plant identification, plant disease research, plant biodiversity protection, the establishment of a digital biodiversity museum, agricultural consolidation, forestry, and other information technology fields.

Leaf identification is an important part of identifying plant species. The leaf conditions of plants vary, and each plant has its own stable characteristics. This is the foundation and beginning of the identification and appreciation of plants. Each part of the plant has a tax code, and the leaves are often used as the main reference for plant features and plant identification. The leaf of the plant is a two-sided planar, which is easy to process and process images. Therefore, it is very important to establish an automatic identification of leaf-based plant species to locate and accurately identify plant species. However, due to the diversity of plants, the complex and varied leaf shapes, single technologies may not be the best solution, but rely on the full use of different technologies.

In plant-based crop identification, the basis for plant diversity mainly consists of three: leaf shape, color, and texture. Because the color of most leaves will gradually change over time, the collection of leaf colors will have time constraints. However, the shape of the leaves at different times is the same, often changing only in size, and the different categories of leaves are different, making it one of the main identifying marks of the plant. Compared with color and shape, leaf veins have more stable features, and different leaf veins are very different. As a measure of plant identification, it is easy to distinguish plant species. In order to remove the shape and characteristics of the leaf, it is necessary to remove one image of the leaf in a complex place such as the leaf material to remove the shape and texture. Leaf object removal requires the use of a leaf separation technology, which is to separate the image into different image blocks of the image, in the same region can show the same features, where certain regional structures method and process are saved. Cope and others have used Gabor fi enter to calculate leaf formation for diagnosis, with an accuracy rate of 85.16%. Rossetto lists the texture features of the leaves and the pointing leaves. Aptoula E et al. proposed an algorithm for identifying plants based on mathematical morphology to exclude plant contours and vascular markers in 2013. However, this method is easily blocked by external factors (seasonal variation illumination, etc.), which reduces the accuracy of leaf identification. The LBP algorithm was first proposed by Ojala in 1994 with the release of the texture element. The grayscale LBP operator has excellent anti-distortion capability and can reduce the contrast brightness of the image when calculating page features and different leaf veins are very different. As a measure of plant identification, it is easy to distinguish plant species. In order to remove the shape and characteristics of the leaf, it is necessary to remove one image of the leaf in a complex place such as the leaf material to remove the shape and texture. Leaf object removal requires the use of a leaf separation technology, which is to separate the image into different image blocks of the image, in the same region can show the same features, where certain regional structures method and process are saved. Cope and others have used Gabor fi enter to calculate leaf formation for diagnosis, with an accuracy rate of 85.16%. Rossetto lists the texture features of the leaves and the pointing leaves. Aptoula E et al. [4] proposed an algorithm for identifying plants based on mathematical morphology to exclude plant contours and vascular markers in 2013. However, this method is easily blocked by external factors (seasonal variation illumination, etc.), which reduces the accuracy of leaf identification. The LBP algorithm was first proposed by Ojala in 1994 with the release of the texture element. The grayscale LBP operator has excellent anti-distortion capability and can reduce the contrast brightness of the image when calculating page features. It is found that the combination of multiple factors can improve the level of recognition [6]. Currently, image classification methods mainly include the following: regional division, edge separation, and threshold separation.

The artificial neural network (ANN) is proposed to define the structure of the neural network with a simple mathematical model and to mimic the intelligent behavior of the neural network to some degree under the guidance of specific assurances. A neural network is a non-linear guess from the input space to the output area. Learns or acquires a relationship between variables by adjusting instruments and parameters. The neural network (ANN) has the ability to guess offline which is made up of a number of simple basic units that are connected to each other and connected to weight lovers. This same large structure has high computer speed. In this multi-layer network structure, the technical network conveys information within the weight of the connection, so that the network can tolerate high errors and be robust. Currently, the application of neural network theory has made significant progress, especially in technical intelligence, automatic control, data processing, pattern recognition, and other features that have been widely used. First, this paper examines the existing field of plant photography and visual technology and presents an in-depth reading theory. After that, the high reflection of image elements through the neural art network in deep learning theory is analyzed. ANN model is improved and some new techniques and methods are introduced to construct a new ANN model .The model combines the processes of image classification, the removal of targeted elements, and the separation of objectives.

II. PROPOSED METHOD

This first chapter introduces the process of rendering image elements and image editing. With the conceptual analysis and policy of image processing technology, a cutting-edge approach to the use of plant images is introduced. The features and structure of the SVM algorithm model, the tree decision-making algorithm, and the network performance are analyzed. In the third part of the article, we discuss how to identify plant leaves based on in-depth study, and then analyze and model the positioning of positions. In the experimental part, by analyzing the performance parameters of the image structure before and after image fragmentation, the comparative results of image separation tell tearing optimization simulation are presented.

III. FACTORS AFFECTING PLANT RECOGNITION EFFECT OF DEEP LEARNING

Visualization technology is an important form of intelligence. Image recognition technology is based on key image elements. In-depth learning is the result of the latest outstanding work to solve the concept, planning, placement, and control of the various areas of robotic activity. Studying its excellent capabilities shows that the real nature of complex data acquisition makes it very suitable for various independent robotic applications. The essence of leaf separation is to separate pixels and use machine vision and image processing technology to separate plant leaves in the background. In the course of operation, we focus on potential problems of varying sizes, lack of knowledge, acceptance of standardized features by mechanical learning by models and models, lack of quality and low level of use of information available in the first unpublished features, and studying flawless and limited features. If the repetition rate exceeds the limit of this type of neuron, the neuron will only be visible, thus leading to the next neuron. People are using jobs that can take prices continuously. The key to a common editing problem depending on the photo sets is to think about how to model the photo sets, and how to define the distance or similarity between image sets to achieve integration. In-depth learning using image sensor technology used in many types of applications using different imaging technologies (such as RGB monocular camera, RGB-D sensor, infrared, etc.). The ability to extract image elements sequentially, and to train automated learning features with large amounts of data, the ability to extract earth features and contextual information, have greatly encouraged the development of image recognition technology. The in-depth learning model has strong reading capabilities, can better extract world-class image features and integrate links between units, and can detect and incorporate complex structural features within a problem. When selecting parameters other than the model, such as the reading level and iteration number, the training set is divided into a real training set and the cross-validation is set using the multiplication verification method. By looking at the different effects of different parameters. The in-depth model is also very easy to fix. The model can only be changed by changing the parameters. It can meet a variety of installation and separation requirements and has strong resilience and growth. In an in-depth learning model, some details will be lost in each layer, so system parameters need to be adjusted regularly to make errors between images as small as possible. After the sound has been removed, the focus area can be marked for subsequent processing, instead of separating the entire blade. The multiplicity of digital data plant used, be it a ladder study train, multiple plant digital images were used to place traditional research on the identification and methods of differentiating images of a single plant, i.e., planting a division based on a set of images. The found patterns are combined to form a large pattern, and the following layers find elements that make up these patterns. Compared to traditional engineering, in-depth learning has changed the way we find features.

Because the image is high quality and includes all sorts of great changes. Although the model has used convolution and pooling techniques to keep some comments unchanged, the performance of translating a few pixels on each side of the training image can greatly improve overall performance. Image data acquisition is the basis for data setup. The leaf image algorithm is being studied. The data set requires an initial image and a photo label. With enough output, in-depth learning can learn the most complex tasks. In the release of the image element, the feature element read in the first layer of the deep learning network indicates the presence or absence of ‘‘edges’’ in a specific direction and location, and the pattern is obtained by a special editing arrangement. When the interaction of the system is in control, the system is in a low state of entropy, and when the temperature is high, the system is in a high state of entropy. If we can do the process of state change by temperature, we can understand the process of phase change. The " similarity " extracted from the image can be used as an example to test the image. If the same type is found, the image will be known. This algorithm does not need to make any possible data distribution assumptions. Depending on the reading limit of special classes in the set reading, the images in one test set detect reconstruction errors after sampling. The inner neural artificial network is made up of inserts, convolution layer, sample layer, connection layer, classification layer, and extraction modules. Often the convolution layer and the bottom of the sample are used separately to create a deeper learning structure. Features are highly discriminatory, and the input and output effects are close by adjusting the parameters of each layer with training. Finally, image features are categorized and identified using a classier. Keep improving and updating convolution kernel parameters and bias values, similar to those of normal neural networks. The full connection layer is used for final deployment and integration. Find the right reading rate. If the range is too large, it can be overpriced and lead to very bad results. If the amplitude is too small, it can lead to less progress each time, too much repetition to make a positive effect, and longer use.

IV. Declarations

Ethical approval and participation permit: Allowed. Permission to publish: Allowed. Access to supporting information: We can provide you with details.

V. Competing interests

These are not potential competing interests in our paper. And all authors have seen this manuscript and are allowed to submit it to your journal. We are confident that the contents of this manuscript have not been published or submitted for publication elsewhere.

VI. Conclusion

In this paper, methods of leaf identification of plants are studied based on digital image analysis, and current methods of leaf recognition are well-organized. Introduction to plant leaf recognition technology based on imaging and intelligent analysis. Relative characteristics of the relative and the characteristics of the leaf texture are found in boundary division, edge separation, and regional division. Aimed at the low level of current classier recognition, a neural network compilation method based on the backpropagation error algorithm (BP algorithm) is proposed to detect plant leaves and obtain positive results. The results of the experiments show that the artificial neural network (BP) method is effective and provides the direction of the experimental techniques to identify plant leaves based on image analysis. This method can be used for plant identification, diversification, monitoring plant ecosystems, and other purposes. The neural network algorithm in deep learning has a positive effect on classification and flexibility, but its short comings are obvious.

To make the neural network of art have a high production potential, it needs a large amount of detail such as training samples. in-depth learning requires imitating the intended features of the layer. Although the tests have yielded good results, there is still much work to be done. First, the background of the separation is simple, and the recognition of the leaves in the natural environment and complex background requires further study. Second, the leaf recognition algorithm is still researching, and there is no integrated test method, so it is difficult to find many comparisons between plant species, and the leaf identification algorithm needs further development, refinement, and optimization. In addition, it is difficult to compare the performance and robustness of different algorithms because the leaf database is small and the repair distance is small. Finally, we need to establish an integrated database of plant leaves and use mechanical theory, image analysis, and pattern recognition to establish plant species theory. On the basis of this, we should develop a sound and biodiversity assessment system and establish a comprehensive plant identification system.

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