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# Vegetable Disease Control Problem Discussion

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***ABSTRACT***: *With the increase of vegetable planting species, vegetable disease species also gradually increase, some disease symptoms are very similar, not careful observation is difficult to identify, and lack of disease identification and prevention knowledge of vegetable farmers, the results in the prevention and treatment of drugs can not symptomatic, and the phenomenon of misbehavior. Although some know the disease type, but the prevention and treatment is not scientific, medicine is not reasonable and twice the result with half the effort, so the vegetable production caused great loss. To improve the ability of vegetable farmers to identify and scientifically prevent and control diseases, achieve stable, high yield and high quality of vegetables, the disease recognition methods are discussed in the paper.*
***KEYWORDS***: *Vegetable diseases; diseased leaf images; agricultural informatization.*

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## I. INTRODUCTION

In the process of the development of agricultural informatization, computer vision technology is one of the main development directions in the field of agricultural informatization [1]. The use of computer vision technology for intelligent management and planting of agricultural production has become the main trend of agricultural development in many countries. Plant diseases and insect pests seriously affect the quality and yield of agricultural products in the process of agricultural production. With the development of computer vision technology, it has become the main research direction of many researchers to use it to solve the problem of plant disease identification. The use of computer vision for plant disease identification can effectively solve the shortcomings of artificial disease identification [2]. In the process of identifying plant diseases, the key step is to distinguish the normal part of plant leaves from the diseased part. The accurate segmentation of plant leaf spots determines the accuracy of plant disease identification. However, in the process of plant disease segmentation, the photographed plant leaves were under natural light conditions, so they contained a large number of background noises such as sky, soil and dust, which had a great impact on the accurate segmentation of plant disease leaves [3].

### 1. Discussion of disease recognition methods

The production of vegetable diseases has been the main reason restricting the efficient and safe production of vegetables. In recent years, China's number of planting area, planting vegetables, plant category gradually increased, accompanied by a variety of new types and new forms of traditional disease, traditional way of planting and disease prevention methods have been unable to meet the quality requirements of agricultural products, low disease in vegetable production and vegetable quality cannot meet people's demand growing problem. In general, vegetable fields will lose 20-30% of their production due to diseases, and even lose 50-60% of their production due to serious diseases, which will bring huge economic losses to people and limit the long-term sustainable development of vegetable industry.

With the extensive application of agricultural intelligence and refined technology, more accurate vegetable quality detection is needed. Early, rapid and accurate diagnosis of diseases is the key to effectively control disease occurrence and improve vegetable quality. At present, according to the current level of science and technology in China, the main means of preventing and controlling vegetable diseases in agricultural

production is still rational use of chemical pesticides. Most farmers knowledge level is not high and the lack of plant protection experts, often mistakenly diagnose disease categories or not as soon as possible to prevent diseases, lead to disorderly use, abuse of chemical pesticide, effective control of vegetable diseases spread, not only can cause the pollution of vegetable land and live near production water contamination, pesticide residues and a series of additional health problems affecting eaters, largely damage agricultural vegetable food quality and safety issues.

The reasonable and correct use of chemical pesticides is an important way to ensure vegetable yield, vegetable quality and vegetable food safety. It can reduce the pollution caused by pesticides to the environment and vegetables and at the same time inhibit the growth of vegetable diseases, increase the yield of vegetables and realize green plant protection. Quickly and accurately obtain vegetable disease category and the degree of disease is one of the prerequisite for the rational use of chemical pesticides, agricultural producers can without the help of the plant protection experts according to the disease information timely and effective prevention and control measures, inhibit the further development of plant disease, thereby reducing diseases caused by the loss. Therefore, the advance, rapid and accurate diagnosis of diseases is the key to effectively control the occurrence of diseases and improve the quality of vegetables, which is of great significance to improve the green and sustainable production capacity of vegetables.

For a long time, in the process of vegetables grown in traditional methods of pathology, disease observation method, relying on the farmer's own experience with the visual observation of disease diagnosis to vegetables, although have a certain effect, but due to the farmers' knowledge level and personal experience is limited, often miscalculation or types of farming diseases are not carry on the scientific classification of disease degree, lead to did not suit the remedy to the case or chemical pesticide concentration is too low unable to remove disease and high concentration of chemical pesticide for vegetables, agricultural land and water pollution caused by the nearby. Some farmers employ plant protection experts on site to guide or collect samples for infection experiments, but the period is long, a lot of manpower and financial resources are consumed, and the help farmers receive is very limited. Due to the complexity of the appearance of vegetable diseases, it is difficult to use unified, accurate numerical description, it is difficult to simply rely on experience and professional knowledge to analyze and diagnose the disease of plants. Therefore, the research on the classification and identification of vegetable diseases and the evaluation method of disease degree is of great significance for improving vegetable yield and quality, avoiding resource waste and environmental pollution, and realizing green and sustainable development of agricultural industry.

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China has long been a traditional agricultural country, agriculture is the foundation of the national economic development, China's population less arable land, plus in recent years due to rapid economic development brings a series of environmental problems, the sandstorm led to desertification, lack of water resources in some regions, forcing our country must accelerate the process of traditional agriculture to modern agriculture. Along with the Computer Vision Technology, Computer Vision Technology) as well as the development of artificial intelligence Technology, image recognition Technology has been widely used in the agricultural sector, reflects its unique superiority, has made significant achievements, mainly used in fruit quality detection, seed quality inspection, identification of fruit, fruit quality grading, disease recognition and other fields. With the rapid development of deep learning and machine learning algorithms in recent years, the accuracy and efficiency of recognition are further improved, and the application of computer vision in the field of agriculture will have greater application value and broader application prospects.

With the introduction of the concept of artificial intelligence in the 1950s, pattern recognition technology based on image processing was derived. In the 1980s, image recognition technology was used in vegetable disease detection.Male spike wave letter, etc. [4] (1989) for mushroom leaf is lack of Fe, Mg, Ca of nutrient elements in basic research, the threshold segmentation method for mushroom of RGB image segmentation, then through, mushroom leaf disease in partial area and leaf area ratio as whether Mr. Mushroom with deficiency disorder, due to inadequate feature selection, failed to achieve the ideal experimental results; Yuataka SASAKI, etc. (1999) [5] for cucumber anthracnose puts forward a method of recognition from two aspects of spectral characteristics and optical filtering analysis the effects of the genetic algorithm on cucumber anthracnose recognition to build spectral reflection feature and shape feature recognition parameters, because did not fully consider color texture information, failure to obtain a better recognition accuracy; LuigiBodria et al. [6] used a low-pass filter, 200w power and 360nn-430nm hernia light source to collect wheat images in different multi-spectral bands, and used multi-spectral images to identify wheat images infected with different fungi, so that the disease could be observed with the naked eye two days before the disease occurred. Mohammed el-helly et al. [7] utilized the neural network to develop a comprehensive image processing system for automatic detection of cucumber powdery mildew and mildew, which could better identify cucumber leaf diseases. Mohammad Sammany et al. [8] used rough sets to reduce input characteristics of the neural network in order to improve recognition efficiency. Genetic algorithms were used to optimize the network structure and training parameters of the neural network, and support vector machines were used as classifiers to improve the recognition effect of plant diseases. Sanyal et al. [9] used neural network to classify and identify rice leaf diseases, with an accuracy rate of 89.26%. Tellaeche et al. [10] used Hough transformation and Gabor filtering method to detect the arrangement of field vegetables on the basis of scene perspective geometry principle, and then used area marking method and bayesian recognition algorithm to identify weeds between rows to solve the problem of weed identification with different spatial frequencies. V. a. gulhane et al. combined the color and shape characteristics of cotton leaf spots with BPN neural network to identify cotton leaf diseases and achieved good results. Pramod s. landge et al. proposed an automatic plant disease recognition system based on the extraction method of neural network and image texture, shape and color features. P. Revathi et al. extracted color features such as color and texture by means of oblique scatter method, and extracted edge and CYMK color features. Then, support vector machine and BPN network were used to classify and identify plant diseases. Sharada p. Mohanty [11] used AlexNet and GoogLeNet network model to identify 54306 pictures in PlantVillage, a public data set, including 14 plants of 38 categories and 26 diseases, achieving a good recognition effect, with the highest recognition accuracy reaching 99.35%. Jihen et al. [12] proposed an improved convolutional neural network model based on deep learning to identify banana diseases, and obtained good experimental results. Ye h. j. [13] to the k-means clustering are initial gaussian mixture model for optimization, by morphological operation to remove the image noise and make the segmentation boundary more smooth and improve the quality of cucumber under complex background image detection accuracy, shorten the

processing time, the experimental results show that the improved cucumber edge extraction algorithm has obtained the good segmentation effect, the accuracy is 93.88%, the recall rate is 99.35%, the F - Measure up to 96.53%, the misclassification error less than 5.84%.

## 2. Diseased leaf segmentation

In recent years, with the continuous deterioration of the ecological environment, the growth environment of plants has become complex and diverse. Due to the limited adaptability of plants to the ecological environment, the variety of plant diseases increases, the incidence rate is fast and it is difficult to control and other problems [14]. Plant diseases are one of the main factors leading to the reduction of agricultural products' output and quality. If diseases occur and effective prevention and control measures are not taken in time, serious economic losses will be caused and even the stable development of society will be directly affected [15]. Through a large number of studies, it has been found that most plant diseases mainly occur on plant leaves, and plant disease types can be determined by observing plant leaves [16]. The traditional method of plant disease determination mainly relies on the artificial eye observation, which is time-consuming and laborious, and needs to consume a lot of human resources. Moreover, many plant diseases have a small spot area in the early stage, so it is difficult to determine the disease type by artificial means. The diseased leaf images are shown in Figure 1.

**Figure1** Vegetable diseased leaf images

Existing segmentation method including threshold segmentation, regional segmentation [17], [18] of edge detection and pixel division [19], clustering segmentation method such as [10] can't realize the accurate segmentation of the disease, because the disease recognition in the process of classification recognition and image understanding are built on the basis of accurate segmentation, so incomplete and segmentation boundary of the segmentation results of hollow recognition accuracy will lead to diseases such as lower. Therefore, it is of great significance to study the segmentation of plant disease leaves for the accurate identification of subsequent disease types and timely prevention and control.

Since computer vision technology has been widely applied in the field of agricultural production, the segmentation of plant disease leaves by different methods has been a hot research topic [20]. During the segmentation of plant leaf diseases, many image segmentation methods cannot completely segment the disease regions of leaves, and some methods can only be applied to a single plant species. Therefore, researchers hope to find a method that can be applied to a variety of plants and has a good segmentation effect. With the deepening of the research, scholars have noticed that in the growth process of plants, different plants and different growth stages of the same plant produce different color, texture, shape and other information of disease spots on the leaves, all of which affect the precise segmentation of disease spots [21].

## II. CONCLUSION

To sum up, it is relatively late to apply computer vision related technology to vegetable disease recognition in China. In recent years, many domestic researchers have conducted extensive research in the field

of agriculture by using image processing, pattern recognition and machine learning algorithms. Previous research scholars mainly selected the research objects as wheat, corn, tomato and other vegetables that are easy to identify diseases. Due to the variety of cucumber disease types are not easy to identify, which increases the difficulty of relevant research, resulting in the lack of relevant research, and even less research on the degree of cucumber leaf disease. In the past, the identification methods used in the research mainly adopted single or multiple color, texture and shape features, and the features were mostly selected by people. The classification and identification by using the traditional identification methods would result in low accuracy, low efficiency and limited object recognition.

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