IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

DETECTION AND PREDICTION OF CROP DISEASES AND PESTS

Mr Ambarish Kaneri
Assistant Professor
Govt. First Grade College, Humnabad
Dist: Bidar Karnataka
Ambrish.kaneri@gmail.com

Abstract: The population growth rate of recent years, a doubling of the current worldwide crop productivity is expected to be needed by 2050. Pests and diseases are a major obstacle to achieving this productivity outcome. Therefore, it is very important to develop efficient methods for the automatic detection, identification, and prediction of pests and diseases in agricultural crops. To perform such automation, Machine Learning (ML) techniques can be used to derive knowledge and relationships from the data that is being worked on. This survey aims to contribute to the development of smart farming and precision agriculture by promoting the development of techniques that will allow farmers to decrease the use of pesticides and chemicals while preserving and improving their crop quality and production. Plant disease and pets are important factors determining the yield and quality of plants. Plant disease and pets identification can be carried out by means of digital image processing. In recent years, deep learning has made breakthrough in the field of digital image processing, far superior to traditional methods with traditional plant disease and pet's detection methods.

It also covers survey on different diseases classification techniques that can be used for plant leaf disease detection. Image segmentation, which is an important aspect for disease detection in plant leaf disease, is done by using genetic algorithm.

Keywords: plant diseases and pests; classification; detection; forecasting; precision farming; machine learning; smart farming.

Introduction

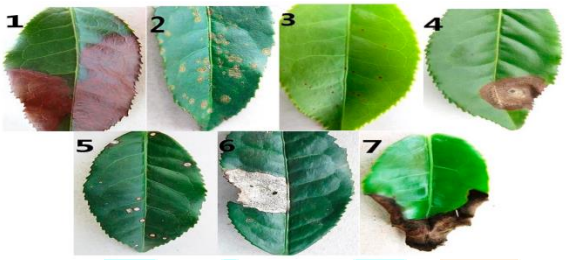
Indian economy is highly dependent of agricultural productivity. Therefore in field of agriculture, detection of disease in plants plays an important role. To detect a plant disease in very initial stage, use of automatic disease detection technique is beneficial. For instance a disease named little leaf disease is a hazardous disease found in pine trees in United States. The affected tree has a stunted growth and dies within 6 years. Its impact is found in Alabama, Georgia parts of Southern US. In such scenarios early detection could have been fruitful.

The existing method for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases is done. For doing so, a large team of experts as well as continuous monitoring of plant is required, which costs very high

when we do with large farms. At the same time, in some countries, farmers do not have proper facilities or even idea that they can contact to experts. Due to which consulting experts even cost high as well as time consuming too. In such conditions, the suggested technique proves to be beneficial in monitoring large fields of crops. Automatic detection of the diseases by just seeing the symptoms on the plant leaves makes it easier as well as cheaper. This also supports machine vision to provide image based automatic process control, inspection, and robot guidance.

Proposed methodology

Digital camera or similar devices are use to take images of leafs of different types, and then those are used to identify the affected area in leafs. Then different types of image- processing techniques are applied on them, to process those images, to get different and useful features needed for the purpose of analyzing later.



Algorithm written below illustrated the step by step approach for the proposed image recognition and segmentation processes:

1. Image acquisition is the very first step that requires capturing an image with the help of a digital camera.
2. Pre-processing of input image to improve the quality of image and to remove the undesired distortion from the image. Clipping of the leaf image is performed to get the interested image region and then image smoothing is done using the smoothing filter. To increase the contrast Image enhancement is also done.
3. Mostly green colored pixels, in this step, are masked. In this, we computed a threshold value that is used for these pixels. Then in the following way mostly green pixels are masked: if pixel intensity of the green component is less than the pre-computed threshold value, then zero value is assigned to the red, green and blue components of the this pixel.
4. In the infected clusters, inside the boundaries, remove the masked cells.
5. Obtain the useful segments to classify the leaf diseases. Segment the components using genetic algorithm

Discussion

Compared with other image recognition methods, the image recognition technology based on deep learning does not need to extract specific features, and only through iterative learning can find appropriate features, which can acquire global and contextual features of images, and has strong robustness and higher recognition accuracy.

The basic idea of deep learning is: using neural network for data analysis and feature learning, data features are extracted by multiple hidden layers, each hidden layer can be regarded as a perception, the perception is used to extract low-level features, and then combine low-level features to obtain abstract

high-level features, which can significantly alleviate the problem of local minimum. Deep learning overcomes the disadvantage that traditional algorithms rely on artificially designed features and has attracted more and more researchers' attention. It has now been successfully applied in computer vision, pattern recognition, speech recognition, and natural language processing and recommendation systems.

Traditional image classification and recognition methods of manual design features can only extract the underlying features, and it is difficult to extract the deep and complex image feature information. And deep learning method can solve this bottleneck. It can directly conduct unsupervised learning from the original image to obtain multi-level image feature information such as low-level features, intermediate features and high-level semantic features. Traditional plant diseases and pests detection algorithms mainly adopt the image recognition method of manual designed features, which is difficult

Conclusion and future work

For traditional machine vision-based plant diseases and pests detection method, conventional image processing algorithms or manual design of features plus classifiers are often used. This kind of method usually makes use of the different properties of plant diseases and pests to design the imaging scheme and chooses appropriate light source and shooting angle, which is helpful to obtain images with uniform illumination. Although carefully constructed imaging schemes can greatly reduce the difficulty of classical algorithm design, but also increase the application cost. At the same time, under natural environment, it is often unrealistic to expect the classical algorithms designed to completely eliminate the impact of scene changes on the recognition results. In real complex natural environment, plant diseases and pests detection is faced with many challenges, such as small difference between the area and the background, low contrast, large variations in the scale of the area and various types, and a lot of noise in the lesion image. Also, there are a lot of disturbances when collecting plant diseases and pests images under natural light conditions.

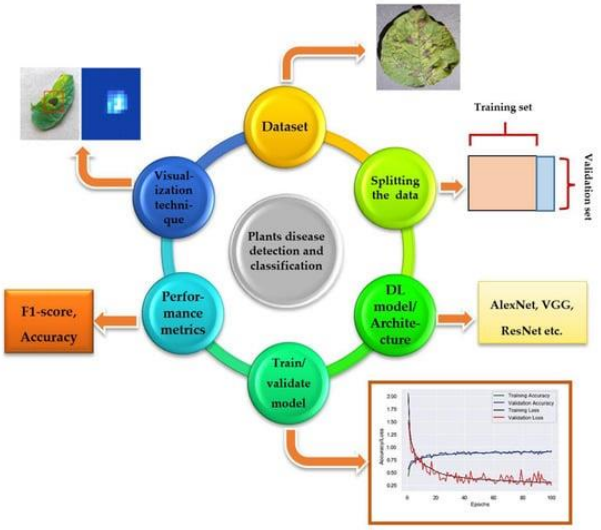
Traditional plant diseases and pests detection algorithms mainly adopt the image recognition method of manual designed features, which is difficult and depends on experience and luck, and cannot automatically learn and extract features from the original image. On the contrary, deep learning can automatically learn features from large data without manual manipulation. The model is composed of multiple layers, which has good autonomous learning ability and feature expression ability, and can automatically extract image features for image classification and recognition. Therefore, deep learning can play a great role in the field of plant diseases and pests image recognition. At present, deep learning methods have developed many well-known deep neural network models.

Image recognition (or image classification) is the task of identifying images and categorizing them in one of several predefined distinct classes. So, image recognition software and apps can define what's depicted in a picture and distinguish one object from another.

The field of study aimed at enabling machines with this ability is called **computer vision**. Being one of the computer vision tasks, image classification serves as the foundation for solving different problems, including:

Conclusion

In different growth cycles, the appearances of diseases and pests are different. Therefore, the images of diseases and pests should be divided more carefully, and the same class of diseases and pests should be divided according to the growth period as the standard. In the future, the division of dataset will be improved. In order to make the model more widely applied, the next work will collect a large number of high-quality images of different types of diseases and pests, and proceed to insert other insect pests, optimize and adjust the model, and extend this to other crops, so as to improve the practicability and accuracy of crop diseases and pests image recognition.



Based on our current, limited understanding of the types of interactions that occur between host plants and pathogens, the mechanisms involved are varied and complex. Theoretically, a minimum of two criteria are involved. The first is recognition. There may be preformed molecules in both host and parasite that can interact. Second, there must be metabolic changes in the host or pathogen or both that are triggered by the initial interaction step. Genetic mutations in either host or pathogen can change the specificity of molecular interactions or their ability to trigger metabolic change.

Compared with traditional image processing methods, which deal with plant diseases and pests detection tasks in several steps and links, plant diseases and pests detection methods based on deep learning unify them into end-to-end feature extraction, which has a broad development prospects and great potential.

Reference:

[1].https://www.fao.org/news/story/en/item/1402920/icode/.

[2].https://www.ncbi.nlm.nih.gov/books/NBK216440/#:~:text=The%20damage%20to%20plants%20caused,can%20totally%20destroy%20a%20crop

[3].https://www.analyticsvidhya.com/blog/2020/11/artificial-intelligence-in-agriculture-using-modern-day-ai-to-solve-traditional-farming-problems/

[4].https://www.analyticsvidhya.com/blog/2020/11/artificial-intelligence-in-agriculture-using-modern-day-ai-to-solve-traditional-farming-problems/

[5]. https://www.v7labs.com/blog/ai-in-agriculture#h2

[6]. https://encyclopedia.pub/entry/2567

[7].https://www.wur.nl/en/Research-Results/Research-Institutes/plant-research/Biointeractions-Plant-Health/Diseases-and-pests-in-crops.htm.

[8].https://www.frontiersin.org/articles/10.3389/fpls.2020.00898/full.

[9]. https://www.frontiersin.org/articles/10.3389/fpls.2016.01419/full

[10]. https://ieeexplore.ieee.org/document/9754170

[11]. http://www.cse.griet.ac.in/pdfs/journals19-20/33.pdf

[12].https://www.semanticscholar.org/paper/Leaf-Disease-Detection-using-Image-Processing-Karthikeyan-Anusha/ed2e83167d8789cabf5ddf9204ce4b7e1d0b361c

[13]. https://www.slideshare.net/muneeshwari/detection-of-plant-diseases

[14]. https://prezi.com/ch2idua5cx7z/leaf-disease-detection-minor-project-ppt/

[15]. https://slideplayer.com/slide/17997619/

[16]. https://www.coursehero.com/file/95926452/BE-Project-PPTpptx/

_____