Crop Diseases Detection In Geographical Dimensions

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Abstract

India is well known for Agriculture all over the world as agriculture and its industry are the primary source of livelihood for more than 50% of the Indian people [1]. The agriculture and its allied sector contribute20.19% in the Indian economy[2]. Similarly, the Indian food industry contributes for 32% in the country's total food market which is one of the largest industries in India.Recognizing disease from the images of the rice plant is very interesting research areas in computer as well as agriculture field. This paper presents a survey of different image machine-learning techniques used for identification of plant diseases.

Introduction

Agriculture is the livelihood of India.Various issues affect the yield of agriculture by causing severe diseases in plants.Them Modification so interruptions the normal functioning of plantsarecausedby diseases.The infection of diseases is mainly caused due to the agents of

nematodes,viruses, bacteria and fungi.Due to the attack of various pests and the diseases, at different phases of crop growth, certainthreatsare really faced by the farmers.This Is because; the unpredictable cyclic change of climatic conditions and the new trends of the modern society tend to operate against nature.The overall spreading velocity and the severity of diseases are determined by the capability of crops to withstand the infections. Thus, vulnerability of crops is measured on the basis of resistance level of paddy crops, which is gradually increased with the improvement of resistance level in the crops; whereas, less level of improvement in resistance level results in rapid increase of vulnerability. The symptoms of diseases in the rice plant, since its beginning stages are noted from certain variations such as color, growth, shape and size of the paddy crops.Some Commonly seen symptoms are dot and dark spot which appears in the leaves and other parts of the plant and abnormal root region bulging. From these specified symptoms,the infections are diagnosed in the early stage of disease and it helps to protect the crops from complete damage.Due to drastic increase in population, there is a huge demand for more crop yield.However, nowadays, the yields are not satisfying the growing demand due to the increased pathogens in the crops. Thus, it is necessary to measure the quality of leaves such as the degree of excellence,state of the leaves about its specific variations and the nature of defects.

Based on the nature of key causal agents, the diseases of plants are categorized into two types: infectious and non-infectious diseases. Several pathogenic organisms such as fungal, virus, viroid, nematode, mycoplasma, bacteria etc. are capable of initiating any infectious type of leaf disease. The property of an infectious agent is to reproduce high on its host and to propagate from one leaf to another. Likewise, the other conditions such as deficiency of an essential mineral, disadvantageous out relationship between oxygen and moisture, toxic constituents in the atmosphere or soil,excess temperature can affect the leaves of the plants. The reproducing capability of non-infectious causal agents is compared with infection agents. The different types of plant diseases for wheat and rice crops are shown in Fig 1 and Fig 2.

Every year, about 50,000 new-born diseases are survived in the world that disturbs the normal attitudes plant behaviour.Hence,it is necessary to control such effective disease causing organisms for producing better food and the survival of the overall living beings, especially humans.Some commonly used plants such as Groundnut, soybean, cotton, Wheat, Rice and Bajra Mainly affected by diseases such as wilt, powdery mildew, Rust, Leaf spot etc.
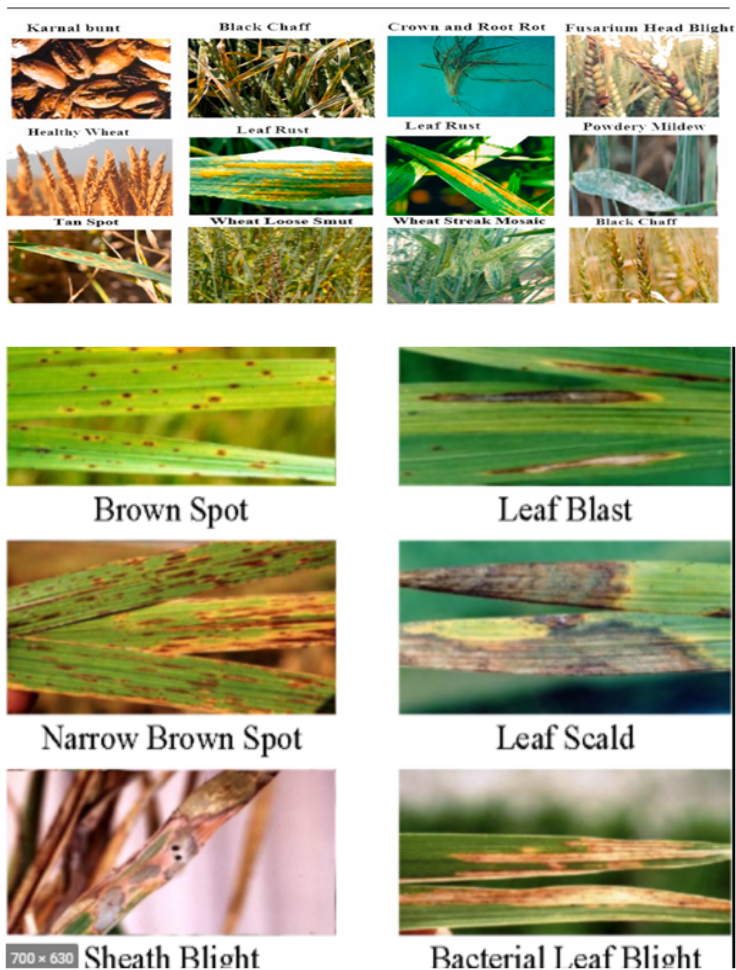
Fig. 2 RicePlantDiseases

Process Involved in Image Processing of Crops

With the advancement of technology as shown in fig 3, there is several Machine learning, Deep learning techniques used

in the computer vision which helps us for the identification of disease. Some of the deep learning and machine learning techniques is Support vector machine, K Nearest neighbor, Convolutional Neural Networks, Long Short-Term Memory, RecurrentNeural Networks, K-Means Clustering, Decision Tree, Deep Convolutional Neural Network, Convolutional Neural Network (CNN). 0 lakh acres were affected by the brownplanthopperdiseaseinasingle year. Elias Ennadif [3] proposes the method of image segmentation by using Mask R-CNN. Sometimes due to camera flash and having yellow background, it is complicated to segment the images therefore, mask R-CNN method is used to extract out wheat spikes from the image. In this method, the red channel is removed from the image and no need to re train the model. It will be help us to segment more than 80% of image data. This model generates rectangular boxes for each object in the image.
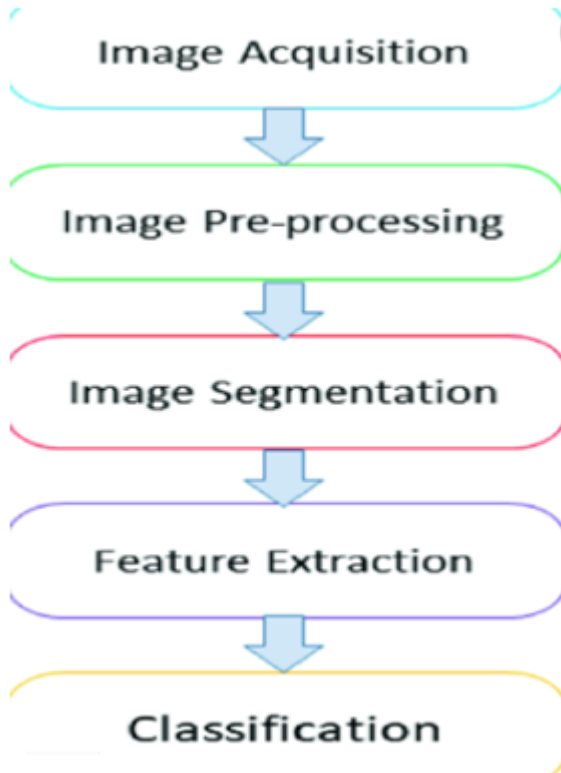
Fig.3 ProcessInvolvedinImageProcessingofCrops

extraction is the first stage in the image processing techniques for the disease extraction phase. The GrabCut technique is used to extract the foreground which will further help in removing noise. Then the texture of the image is extracted using canny edge detection method. Then using color filtering process the disease part of the leaf is identified and also check whether the disease is present in the image

or not. Sumair Aziz [6] proposes the feature extraction method which extracts the Local Tri-Directional patterns and enhances the image. It works best for the tasks where classification was performed using SVM Classifier. It can identify the radius or we can say distance from the central pixel to their neighbouring pixels. Three distances are calculated for each neighbouring pixels. Then tri directional features are estimated and convert them into binary for good results. Then magnitude pattern value is generated for each neighborhood pixel. Then their histogram are generated which are further combined to generate final features

Result and Discussion

The different algorithms used for the recognition of several plant diseases are listed in theTable3.

Table: 3 Classification Based Algorithms for Different Plant Diseases

Author/Year	Aim	Disease Recognized Plant	Classification based algorithm
Brahimietal.(2017)	Tomato leaf detection	Tomato	Convolutional Neural Network

Mokhtar,El Bendary Bassenian,Emary, Mahmoud,Hefnyan dTolba(2015)	Tomato leaf detection	Tomato Leaves	SupportVec tor Machine
Mengistu Metal.(2016)	Detectthedi seasesofEt hiopiancoff eeplant.	GLCMandcol ourfeatures	KNN,ANN, Nave,SOM
Pujarietal.(2016)	Recogni tion And Classific ation Of Images Of plant diseases.	GLCMandc olourfeatur es	ANNandSV M
AthanikarandBada r(2016)	Potato Leaves detection	Potato Leaves	ArtificialNeu ral Network
Karmokaretal.(201 5)	Tealeaves detection	Tealeaves	ArtificialNeu ral Network

KaurandLaxmi(2016)	Various plant leaves	Different Plant leaves	KNNalgorithm
Abirami(2017)	Guava Leaves analysis	Guava Leaves	SupportVector Machine
Thakuretal.(2018)	Cereal Crops analysis	Cereal Crops	NaiveBayes classifier
Chaudhary Et Al.(2016)	Groundnut plants analysis	Groundnut	RandomForestclassifier

Conclusion

This paper reveals that,several researches have done work for detection and classification of the disease occurrence of several plants.Several Algorithms Are used for classifying and segmenting the diseased portion of the plants discussed in this paper .Most of the algorithm scalculatediseaseinfectionarea for different crops.

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