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Risk Assessment of Agricultural Soil Heavy Metal Pollution

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ABSTRACT: Agricultural productivity is something on which Indian economy highly depends. This is one of the reasons that disease detection in plants plays an important role in agricultural field, as having disease in Maize plants is quite natural. If proper care is not taken in this area, then it causes serious effects on plants and due to which respective product quality, quantity or productivity is deteriorated. Detection of plant disease through some automatic technique is beneficial as it reduces a large work of monitoring in big farms of crops, and at very early stage itself it detects the symptoms of diseases i.e. when they appear on plant leaves. Visually identifying Maize plant diseases is inefficient, difficult, time consuming, requires expertise in Maize plant diseases and continuous monitoring which might be expensive in large farms. Therefore; a fast, automatic and accurate method to detect plant disease is of great importance. Hence, image processing technique is employed for the detection of Maize plant diseases. The implementation of these technologies will lead to improved productivity.

KEY WORDS: Image Processing, K-means Clustering, Artificial Neural Networks, Feed Forward Neural Networks, Cascaded Feed Neural Networks

I. INTRODUCTION

In this paper a software solution for fast, accurate and automatic detection and classification of plant diseases through Image Processing is presented [1]. Identification of the plant diseases is the key to preventing losses in the quality and quantity of the agricultural product. Health monitoring and disease detection of plant is critical for sustainable agriculture. The typical method of studying plant disease is to rely on visually observable patterns on the plant leaves. Visually identifying plant diseases is inefficient, difficult, time consuming, requires expertise in plant diseases and continuous monitoring which might be expensive in large farms. Therefore; a fast, automatic and accurate method to detect plant disease is of great importance. Hence, image processing technique is employed for the detection of plant diseases. The implementation of these technologies will lead to improved productivity India has a diverse agricultural sector. Agriculture plays a vital role in India's economy and over 58 per cent of the rural households depend on agriculture as their principal means of livelihood. Research in agriculture is aimed towards increase of productivity and quality of food. Three are two main characteristics of plant-disease detection machine learning methods that must be achieved, they are: speed and accuracy. In this study an automatic detection and classification of leaf diseases has been introduced, this method is based on K-means as a clustering procedure and ANNs(Artificial Neural Networks) as a classifier tool using some texture feature set .The aim of this work is threefold: 1) Identifying the infected object(s) based upon K-means clustering. 2) Extracting the feature set of the infected Leaf images. 3) Detecting and classifying the type of disease using ANNs(Artificial Neural Networks)

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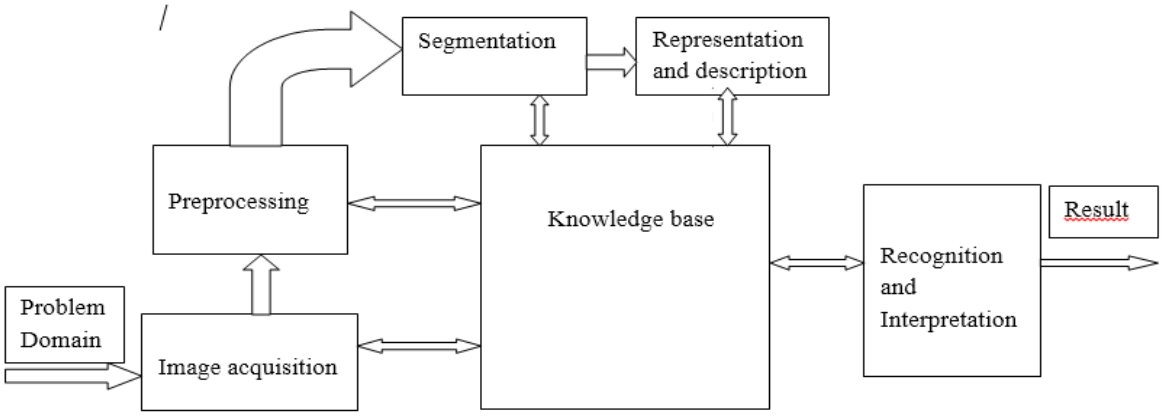

Fig 1.1 Fundamental steps in digital image processing

II. IMAGE SEGMENTATION

The next stage deals with segmentation. Segmentation partitions an input image into its small constituent parts or objects. In general, autonomous segmentation is one of the most difficult tasks in digital image processing. On the one hand, a rugged segmentation procedure brings the process a long way towards the successful solution of an imaging problem. On the other hand, weak or erratic segmentation algorithms almost guarantee eventual failure. In terms of character recognition, the key role of segmentation is to extract individual characters and words from the background.

III. IMAGE REPRESENTATION AND DESCRIPTION

The output of the segmentation stage usually is raw pixel data, constituting either the boundary of a region or all the points in the region itself. In either case converting the data to a form suitable for computer processing is necessary. The first decision that must be made, whether the data should be represented as a boundary or as a complete region. Boundary representation is appropriate when the focus is on external shape characteristics, such as corners and inflections. Regional representation is appropriate when the focus is on internal properties, such as texture or skeletal shape. In some applications, however, these representations coexist. This situation occurs in character recognition applications, which often require algorithms based on boundary shape as well as skeletons and other internal properties.

IV. IMAGE RECOGNITION AND INTERPRETATION

Recognition is the process that assigns a label to an object based on the information provided by its descriptors. Interpretation involves assigning meaning to an ensemble of recognized objects.
For example, identifying a character as, say, c requires associating the descriptors for that character with the label c. Interpretation attempts to assign meaning to a set of labeled entities. For example, a string of five numbers is followed by a hyphen and four more numbers can be interpreted to be a ZIP code.

V. KNOWLEDGE BASE

Based on the above discussion, the need for prior knowledge and or about the interaction between the knowledge base and the processing modules in Fig.1.1. Knowledge about a problem domain is coded into an image processing system in the form of a knowledge database. This knowledge may be as simple as detailing regions of an image where the information of interest is known to be located, thus limiting the search that has to be conducted in seeking that information. The knowledge base also can be quite complex, such as an interrelated list of all major possible defects in a materials inspection problem or an image database containing high-resolution satellite images of a region in connection with change-detection applications. In addition to guiding the operation of each processing module, the knowledge base also controls the interaction between modules.

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VI. METHODS

We proposed a system which helps in detecting the diseases of cotton leaves which will help the farmers to detect disease and take proper prevention to enhance the production of cotton. We took the pictures of diseased cotton leaves and performed various preprocessing techniques on them for removing the boundary of the leaf. The main target is to identify the disease in the leaf spot of the cotton crops. In this regard, It is discussed that about 80 to 90percentage disease on the Cotton crops are on its leaf spot. Consequently, areas of interest is that identifying the leaf of the cotton rather than whole cotton. We used ANN as the classifier for testing the input test image with the database image so that proper disease can be detected. The main objective of the proposed work is to detect diseases in cotton leaves. It is very necessary to detect the diseases in cotton leaves. Detection of cotton leaf diseases can be done early and accurately using Artificial neural network.

Image Pre-processing and Segmentation

The pre-processing involved the procedures to prepare the images for subsequent analysis. The affected lea images were converted from RGB color format t gray scale images. Segmentation refers to the process of clustering the pixels with certain properties into salient regions and these regions correspond to different faces, things or natural parts of the things. We proposed k-means segmentation technique to fragment goal areas. Target regions are those areas in the image that represented visual symptoms of a fungal disease.

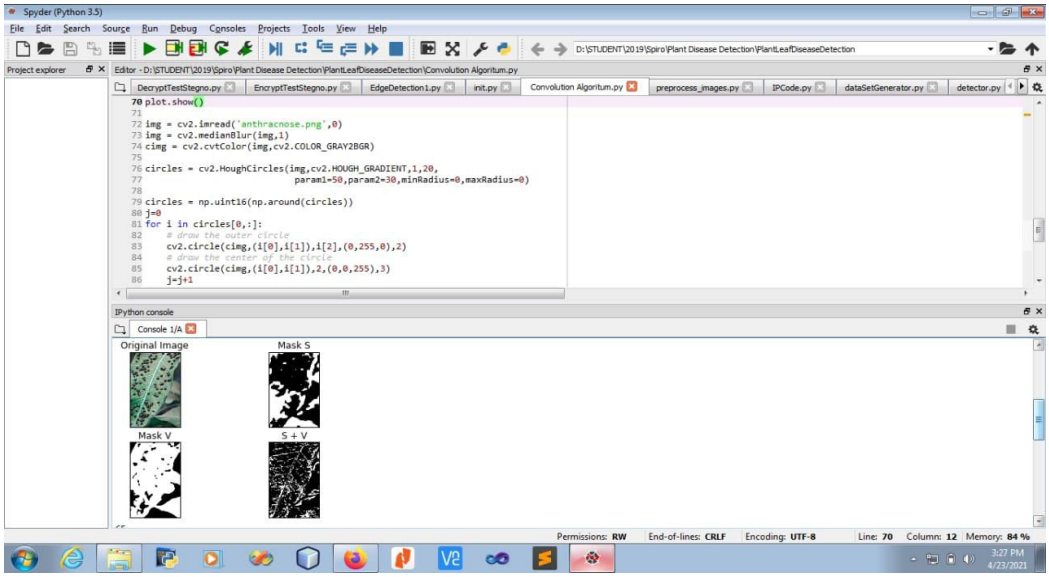
K-Means Segmentation

K-means clustering is a method of vector quantization, originally from signal processing, that is popular for cluster analysis in data mining. K-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster.

In the first phase it calculates the k centroid and in the second phase it takes each point to the cluster which has nearest centroid from the respective data point. There are different methods to define the distance of the nearest centroid and one of the most used methods is Euclidean distance. Once the grouping is done it recalculate the new centroid of each cluster and based on that centroid, a new Euclidean distance is calculated between each center and each data point and assigns the points in the cluster which have minimum Euclidean distance. Each cluster in the partition is defined by its member objects and by its centroid. The centroid for each cluster is the point to which the sum of distances from all the objects in that cluster is minimized. So K-means is an iterative algorithm in which it minimizes the sum of distances from each object to its cluster centroid, over all clusters.

VII. RESULTSOF INITIAL SIX CENTRES FROM KMEANS CLUSTERING

The initial centers obtained from theprogram are shown as seen in the command window. These centers form the basis of the Kmeans algorithm which is used to segment image into different regions i.e healthy an infected. The following image is a tomato leaf diseased image and below are its initial A set of features is extracted from the segmented image which are given as a input while training of the neural network. These features include covariance, standard deviation, entropy and energy. The following is the image of Yellow Sigatokaplant disease and the values of the features are listed below. centers calculated:



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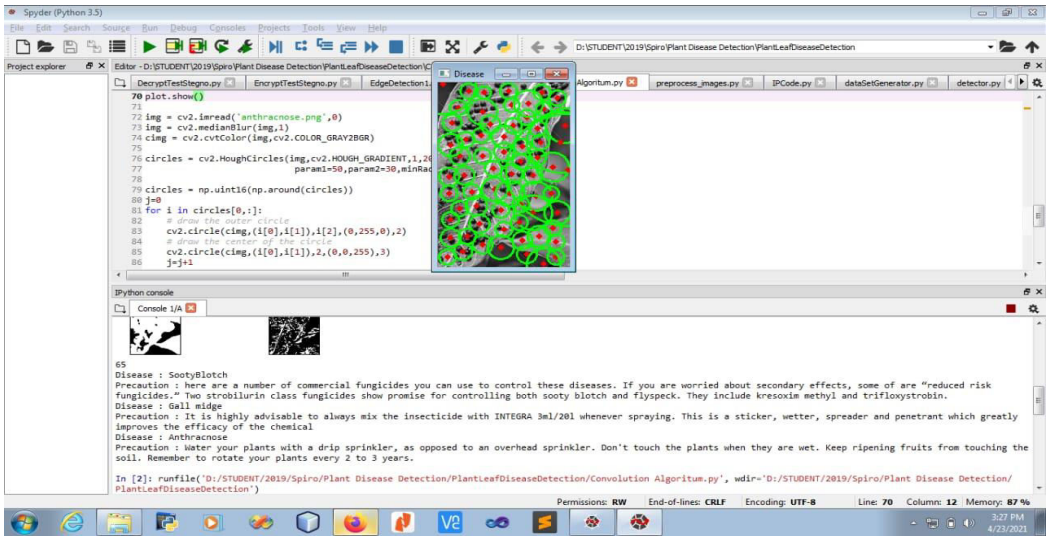

Identified Phyto-pathological problems experiments modules are developed using MATLAB R2014a, which runs in the environment Windows 7,8,10. Two species of samples are taken for the experiment, whose digital images are obtained by a camera. FIG shows the species type and numbers of leaves images for these species for In pattern recognition and information retrieval with binary classification, precision (also called positive predictive value) is the fraction of retrieved instances that are relevant

VIII. CONCLUSION

Recognizing the disease is mainly the purpose of the proposed approach which can recognize the leaf diseases with little computational effort. This approach can be used for the agricultural applications like detection & classification of diseases of plant parts like leaf with suitable classifier .This project will describes a possible approach for extraction of low level image feature like color. This paper addresses how the disease analysis is possible for the cotton leaf diseases detection, the analysis of the various diseases present on the cotton leaves can be effectively detected in the early stage before it will damage the whole plant. The efficiency of the proposed work is about 80% and hence the model presented can able to detect the disease more accurately compare to the other classifiers.

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