Plant Infection Detection Using Image Processing

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ABSTRACT

Economy of a country depends on agricultural productivity identification of the plant diseases is the key for preventing the losses in the productivity and improving quality of the agricultural product. Damage from the insect is one of the major trait. It also damages natural animal food chain. A common practice for plant scientists is to estimate the damage of plant because of disease by an eye on a scale based on percentage of affected area.Traditional method consumes more time and tedious work for labourers.In farm lands,early stages of detection of plant diseases by using automated technique will reduce the loss in productivity.Finding the infected region earlier with more accuracy results in effective detection reduces the time and cost of the farmers which increases income of the farmer and which inturn increases country's economy.

The methods studied are for increasing the throughput and reducing subjective arising from human experts in detecting the plant diseases.

KEYWORDS-ImageProcessing,Sift, Classification, Patterns

INTRODUCTION

Digital image processing is the use of computer algorthims to observe image processing on digital images. Digital image processing is a sub cateogory of digital signal processing.Digital image processing has more advantages over Analog image processing. In Digital image processing we can apply wider range of algorithms to be applied to the input

data and an avoid problems such as build-up of noise and signal distortion during processing. Images are defined over 2D digital

image processing may be modified in the form of multi-dimensional systems.

The image processing can be to pre-owned in agricultural applications for following purposes:
1.To detect diseases leaf,stem,fruit.
2.Toquantifiy affected area by disease.
3.To find shape of affected area.
4.To determine colour of affected area.
5.To determine size and shape of fruits ,leaf etc.

A Country's economy development bank on the agricultural land mass and productivity. Majority of the population are depended on the agriculture. Farmers cultivate various crops based on the soil fertility and availability of resources.Due to changes in the environmental conditions such as rain fall, temperature soil fertility, the crops can get infected by fungi, bacteria and viruses. They use suitable pesticides and herbicides for the plants for anticipating diseases and increasing the productivity and quality of the product. Visual observation patterns on the plants are used for analyzing and studying the plant diseases. Detection of plant disease at the initial stage will be helpful since the disease can be controlled. In few countries the farmers don't have any idea or fluency for contacting the experts. Existing method for detection is visual cognition of the leaf patterns by experts. But it requires large expert team. In such situation a automated plant infection or disease counselling system will be very useful. By comparing the plants leafs in the agricultural farm land with the stored plant disease symptoms by computerization will be cheaper. Here we alocate the plant disease into three namely Anthracnose, Cercospora Leaf Spot and Bacterial Blight. Anthracnose causes faltering shaped spots on the leaf with tan or brown colour. These blotches will be close to leaf veins. Severe infection will result in leaf dropping. Cercospora leaf spot leaf will be having small, brown patch with a reddish border. It spreads out with a grey centre. Later on the leaf tissue becomes thin and friable, and drops out leaving a hole. Bacterial Blight disease can induce trunk, branches, shoots, buds, flowers, leaves and fruit of a plant. A small pale green spots show up on the leaf and it spread over the leaf. Lesion region later become dry dead spot. Sample of the leaf are hand over to the image processing systems for identifying the infection / disease. The various steps sophisticated in Plant disease detection are image acquisition, pre-processing, segmentation, feature extraction and classification.

RELATED WORK

The binary image containing leaf region is achieved by region filling and eliminating holes in the white region. To total the pixels in total leaf , scan the image from top to bottom and from left to right, the number of pixels in the region is Pl=140940. [1].

For doing clustering appropriately, the search facility of GAs can be used, to set of unlabeled points in N-dimension into K clusters. On image data, we have enforced the same idea in our proposed scheme. We have seized a color image of size m × n and every pixel has Red, Green and Blue components. A prediction approach based on support vector matrix for developing weather based prediction models of plant diseases is proposed.[2]

Multi-class support vector machine is used to classify the apples into one of the infected or healthy categories. Apple fruit is enforced as the test case in this study with three categories of diseases, namely blotch, rot and scab as well as healthy apples. was reported that there is a scope of enrichment of this works which involves more experimentation with large training sets to recognize various leaves with pest or damaged leaves due to insects or diseases and advance an expert system.[3]

The segmented leaf image is then analyzed through high pass filter to detect the diseased part of the leaf. The segmented leaf texture is retrieved using unique fractal based texture feature. Fractal based features are locally invariant in nature and therefore provides a good texture model.[4]

Paper[5]First the diseased region is commence using segmentation by K-means clustering, then both color and texture features are extracted. lastly classification technique is used to detect the type of leaf disease.

With the aid of imaging technology the plant disease detection systems naturally detect the symptoms that appear on the leaves and stem of a plant and helps in cultivating healthy plants in a farm. These systems monitor the plant such as leaves and stem and any variation observed from its characteristic features, variation will be automatically identified and also will be informed to the user.[6]

Neural networks provide an aligning between an input such as an image of a diseased plant to an output such as a crop-disease pair. The nodes in a neural network are mathematical functions that take numerical inputs from the incoming edges, and afford a numerical output as an outgoing edge. Deep neural networks are simply aligning the input layer to the output layer over a series of stacked layers of nodes. [7]

RGB color images are represented in the RGB color model as red, green and blue using 8-bit monochrome standard. The corresponding RGB color image has 24 bit/pixel – 8 bit for each color band (red, green and blue). The RGB color represents to referring to arrow or column as a vector, it can be referred as a single pixel red, green and blue values as a color pixel vector -(R,G,B).[8]

Apple scab, apple rot and apple blotch. The image processing based proposed methodology is made out of the concomitant some state of the art color and texture features are extracted from the test image, then color and texture features are blended together and random forest classifier is used for diseases classification and if the fruit is infected by any of the one disease then the infected part is segmented using k-means clustering technique.[9]

These criteria include size of image dataset, no. of classes(diseases), preprocessing, segmentation techniques, types of classifiers, accuracy of classifiers etc[10].

Phenotyping technology can increase the throughput of plant screening in the field.Early season detection of plant diseases is key to reducing crop yield losses.Disease diagnosis relies on symptom recognition through observations and ratings.Remote sensing methods can identify, quantify and monitor plant diseases.[11].

The main idea of this project is to afford a system for detecting wheat leaf diseases. The given system will study the leaf image of a wheat plant over image processing and pattern recognition algorithms. Former algorithms are used for extracting vital information from the leaf and the latter is used for detecting the disease that it is infected with. [12]

The spatial multi-criteria decision analysis approach combines the multi-criteria decision analysis and geographic information system (GIS) to model the spatially explicit and implicit information and to make a practical decision under different scenarios and different environment. [13].

By some approaches, detection before visible symptoms appear is achievable. The potential of hyper spectral sensors as a tool for disease identification and dimension, based on disease characteristic changes in the plants spectral signature [14]

Feature extraction refers to expansive measurements, geometric or otherwise, of possibly segmented, meaningful regions in the image. Features are characterize by a set of numbers that

characterize some property of the plant or the plant's organs captured in the images [15]

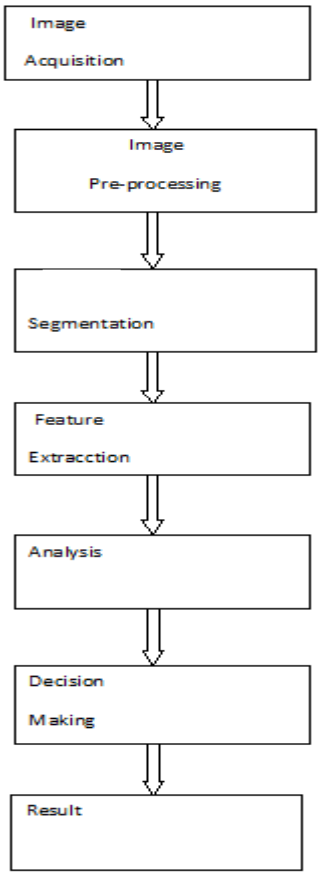
EXISTING SYSTEM

Image processing is very useful in identifying the plant diseases and it produces more efficient results in finding plant diseases. In existing system, plant disease detection is done but does not classify them with more accuracy. Image processing is used in various field to identify and classify the objects and produce results.

PROPOSED SYSTEM

Image Processing algorithm was developed to detect the plant infection or diseases. SIFT is used for diseases classification. Using SIFT may provide accurate results it has many advantages when compared to other feature extraction method.

FLOW DIAGRAM:



HARDWARE COMPONENTS:

Camera
Processor Intel® Core(TM)2 duo CPU T6500 @ 2.10 GHz
RAM 3 GB

SOFTWARE REQUIREMENTS:

MATLAB 7.10
Adobe Acrobat Reader X

METHODOLOGY :

Sugarcane brown spot diseased leaves are seized for this study. Images are seized in controlled environment and are stored in the JPEG format. Infected leaf is arranged flat on a white background; Light sources are placed at 45 degree on each side of the leaf so as to eliminate any reflection and to get even light everywhere, thus an improved view and brightness. The leaf is zoomed on so as to assure that the picture taken contains only the leaf and white background.

3.1 Image Acquisition

First step in image acquisition is to arrest the leaves using mobile phone or digital camera. These stored images of the leaves from the database are load by specifying the path.

3.2 Image Pre-processing

Image segmentation is the important step to separate the different regions with special significance in the image, these regions do not intersect each other and each region should meet consistency conditions in specific regions
Pre-processing improves the quality of the image by removing unsought distortions. Clipping the images based on the region of interest (ROI), image smoothing and contrast enhancement are done here.

3.3 Image Segmentation

Input image is first transformed into gray scale image. Since image is taken in disciplined environment placing diseased leaf on the white background, it makes large difference in gray values of two groups,object and background. After image segmentation, the binary image containing leaf region is obtained by region filling and dispose of holes in the white region. To count the pixels in total

leaf , examine the image from top to bottom and from left to right, the number of pixels in the region is Pl=140940.

Image segmentation is the method of partitioning an image into different sub images. Here we use K-mean segmentation technique which uses hue estimation method for partitioning and clustering the image. Since the green colour of the leaves is normal, we do not deal with them. We select the cluster image displaying the infected area for feature extraction. K-means clustering algorithm, the data vectors are grouped into clusters based on the closeness of the pixels by the Euclidian distance measurement. Centroids of the clusters are initialized randomly and their dimensions are equal to data vectors.

3.4 Feature Extraction

Interesting part of an image from where the required information are extracted is called as feature extraction. Scale-Invariant Feature Transform(SIFT) are mainly four steps involved in SIFT algorithm. First step is Scale-space Extrema Detection. Second step is Key point Localization. Third step is Orientation Assignment. fourth step is Key point Descriptor. Peculiar Image Features from Scale-Invariant Key points, which extract key points and compute its descriptors.

3.5 Classification

Leaves are affected by diseases caused by fungi, bacteria and viruses. Sometime insects also damage the leaf which emerge as leaf spot disease. The infected part of the leaf will differ in size and colour, depending on the stage and organism involved. Spots will be noticed with various colours such as yellow, brown, tan, black.Based on the texture information from SIFT the disease is classified. Here, we allocare the disease as Anthracnose, Cercospora Leaf Spot and Bacterial Blight.

4. CONCLUSION

This work gives efficient and factual plant disease detection and classification technique by using image processing technique. K-means and SIFT techniques are used for plant leaf disease detection. This automated system cut down the time of detection and labour cost. It can help the farmers to diagnose the disease and take remedial action accordingly. In future work, we will broaden our database for more leaf disease identification.

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