INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 5, Issue 3)
Available online at: www.ijariit.com

The survey on detection of plant diseases by image processing technique

Sakshi
vatsya.sakshi123@gmail.com
S. J. C. Institute of Technology, Chikkaballapur, Karnataka

Vachana Shree
vachanashreebs98@gmail.com
S. J. C. Institute of Technology, Chikkaballapur, Karnataka

Vinutha H.
vinuthah01@gmail.com
S. J. C. Institute of Technology, Chikkaballapur, Karnataka

Srinath G. M.
srinathgms88@gmail.com
S. J. C. Institute of Technology, Chikkaballapur, Karnataka

Sowmyashree H. V.
sowmyashreehv4@gmail.com
S. J. C. Institute of Technology, Chikkaballapur, Karnataka

ABSTRACT

The traditional agricultural system is causing various problems regarding the production of crops and it is the main reason for plant diseases. There are few diseases like rice blast, brown spot, red stripe and downy fungal which cause significant reduction in both quality and quantity of agricultural products. As we people were busier in our daily life, we need a technology which can automatically detect symptoms of plants and give information about it for farmers, so they can easily diagnosis it. So the technological world and agro scientists have found a solution for the major problem facing by our farmers regarding plant diseases. There are many plant diseases which can cause various problems in the human race. We can implement a system which detects and prevents plant diseases easily by using "IMAGE PROCESSING TECHNIQUE". This technique initially finds the infected region, later finds features like color, texture, and shape. This can be achieved by 3 steps, first color transformation structure for the input RGB image is created, thus the green pixels are masked and removed by segmentation, later texture statics are computed, and finally extracted features are passed through the classifiers. The major techniques involved in the process are, color space, color histogram, grey level co-occurrence matrix, etc. and classification techniques like support vector machine (SVM), back propagation (BP).

Keywords— *Image processing, Classification technique, Color histogram component Introduction*

1. INTRODUCTION

India is an agricultural country, where more than 70% of the people mainly dependent on agriculture. So, it is our job to maintain "Green India and Clean India". We have to pay attention to green plants. Farmers judge the diseases of plants by their experience, sometimes they go near experts with their problems. But this is not possible every time, because it is one the time tedious job. The major diseases of plants causing by virus, fungi and bacteria are Rice blast, Rice sheath blight, and Brown spot peculiarities. The arrival of these diseases symptoms are not seen properly by our naked eye easily, so we need an automatic detection of plant diseases. So we are using here Image processing technique, it will take an image of the plants as input and returns the same image with detection of its symptoms and diseases so, the farmers get understand the problems and easily find the solution.

Fig. 1: Infected leaf of the cotton plant

In case of severe infection the leaf become fully covered with diseased spots, and in this situation using an excessive amount of pesticides and fertilizers contaminates crop with toxic ingredients, so it is necessary to detect plant diseases at an early stage. In order to detect symptoms of diseases in the early stage, we are implementing a system using 'Support Vector Machine' algorithm and Matlab' tool. We also use a database which contains various samples of diseased and no diseased leaf images. There are various approaches to detect plant diseases like Image Acquisition, RGB to grey scale conversion, Image pre-processing and Image Segmentation. SVM algorithm gives better results as compared to other algorithms. This approach can also be developed using normal techniques like JAVA, but using MATLAB gives an efficient and effective

result. The disease detection starts with taking an image in RGB format later images are converted to grey scale and unwanted part of data from the image is eliminated. Image processing feature includes the colour, size and texture of an image. Then system preserves only infected area in output image then it is compared and disease is detected. Support Vector Machine (SVM) is a discriminative classifier formally defined by separating hyperplane. MATLAB is the software built up around vector and matrix. It produces 2D and 3D images and is used in image and signal processing.

This technique should be useful for farmers so, that farmers can allocate them at the right time before spreading of the disease over a large area. Those diseases cannot be seen through our eyes only then can predict based so their experience, so the systematic methodology was developed for detection and prevention of plant diseases using SVM classifier.

The main objective for designing an automated robotic system is leaf disease detection using image processing techniques and prevention using microcontroller based pesticide spraying. Detection and prevention of plant disease system propose an image pattern classification to identify different disease in leaf with a combination of texture and colour feature extraction. The purpose of this system is to find appropriate features that can identify leaf disease. Based on diseases identified in plants it will automatically generate the prevention required for plants.

2. PLANT DISEASE RECOGNITION FRAMEWORK

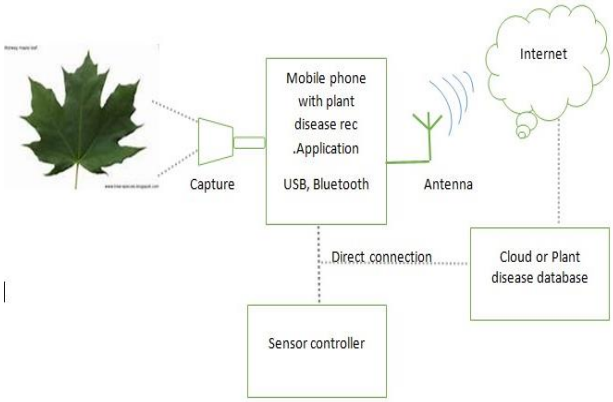

Fig. 2: Plant disease recognition framework

The plant disease recognition framework under development is shown in the above figure. The main functionality of the system operates on a single mobile phone equipped with a colour camera with reasonable resolution. The mobile phone should be capable of connecting to the internet if a more detailed disease database or cloud has to be accessed. This may be required if the number of plants/diseases that can be examined is too high and the recognition rules, patterns and other data cannot be stored locally on the phone.

3. LITERATURE REVIEW

[1] Detection of Diseases for Cotton Leaves and Its Possible Diagnosis, cure by Mr V. A. Gulhane and Dr A. A. Gurjar, Where the colour and spot features could be extracted using a self-organizing feature map together with a back-propagation neural network.

[2] Detection of the unhealthy region of plant leaves and classification of plant leaf diseases using texture features by S. Arivazhagan, et al developed processing scheme in which a colour transformation structure for the input RGB image is created, and then the green pixels are masked. Shape and texture features are extracted.

[3] Mrunalini et al. explained the methods for classification and identification of different disease through which plants are affected. In Indian Economy, a Machine learning based recognition system will prove to be very useful as it saves efforts, money and time too. The main approach is colour co-occurrence method is given for feature set extraction, neural networks are used in the automatic detection of diseases in leaves. The approach proposed supports accurate results for the detection and prevention of plant diseases using an image processing technique.

[4] Kulkarni et al. introduced a systematic methodology for accurate leaf diseases detection and prevention, using artificial neural network (ANN) and image processing techniques. As the proposed approach is based on ANN classifier for classification and Gabor filter for feature extraction, it gives better results with a recognition rate of up to 91%. The artificial neural network (ANN) uses the combination of textures, colour and features to recognize and to classify the different leaf diseases causes to plant.

[5] Dheeb Al Bashish, et al, have proposed a methodology for classification and detection of plant diseases using K means technique, in which images are segmented, k means algorithm technique is used to converts RGB images into HIS colour space, then calculate colour and texture based feature for detection of plant diseases.

[6] The SVM has been used for detection of feature extraction and it is a supervised machine learning algorithm and also nonlinear in nature and set of the related features is also extracted. In this Support Vector Machine is basically increased or improve the accuracy of detection. From the above literature review, it is found that the following techniques are used by different researchers for plant disease detection and analysis:

(a) Backpropagation neural network.
(b) Airborne hyperspectral imagery & red edge techniques.
(c) Image analysis integrated with Central Lab. of Agricultural Expert System (CLASE) diagnostic model.
(d) Combination of morphological features of leaves, image processing, feed forward neural network based classifier & fuzzy surface selection technique for feature selection.
(e) SVM Classifier for developing weather-based prediction models of plant diseases detection.
(f) Wavelet-based image processing technique and neural network.

4. METHODOLOGY

The images of various leaves are captured using a digital camera. Then image-processing techniques are applied to the captured images to extract useful features that are necessary for further analysis.

After that, several techniques are used to classify the images according to the specific problem. The below figure describes the basic step by step procedure of the vision-based detection.

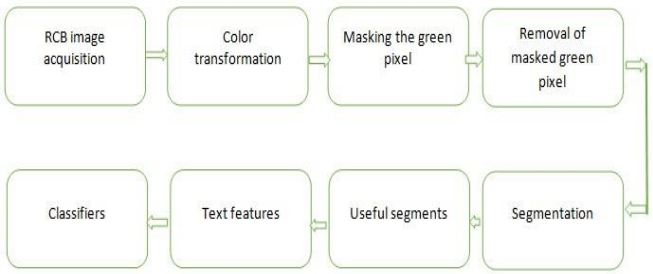

Fig. 3: Block Diagram

The step-by-step procedure of the proposed system:

4.1 The RGB image acquisition

Images are captured using digital cameras. Cameras should have a good resolution for getting good quality images. If the quality of the image is good then diseases are easier to identify.

Images are saved in the database for proper output based on input.

4.2 Color transformation structure

After performing image acquisition colour transformation is done, here RGB segment in images of leaves is transformed to HSI colour space representation. RGB is a colour dependent space model but HSI is colour independent space model. It has been defined by human according to their needs. The main motive of the colour space model is to define the colour and arrange them according to some standards. HSI (hue, saturation, intensity) Hue is a colour attribute that refers to the dominant colour as perceived by an observer. Saturation refers to the process in which the amount of white light added to the images are displayed and impurities are classified easily.

4.3 Masking green pixels

Here, the presence of green pixels is identified. Based on the threshold value generated by solving it mathematically we derive the Red, Green and Blue content in it. If the computed green quantity is less than that of pre-generated red, green and blue than the threshold value is assigned as zero. By performing this step we can easily separate the infected region with a healthy region. Green areas mainly contain healthy part. Masking green pixels together helps in easy identification of unhealthy region.

4.4 Removing the masked cells

This step is the continuation of masking green pixels; here pixels with zero RGB values are removed completely. Which helps us in easy identification of diseases and it reduces the time taken to identify diseases.

4.5 Segmentation

After performing in all the above step, the part of the leaf which is infected is taken. And it is divided into various small regions which are of the same size. Each size of the region is assigned in such a way that all related important information is preserved. A region of size 32*32 is initially extracted. After this step, only useful regions are taken into account. Only a few regions contain more than fifty per cent of information.in future process only those parts will be taken into account and they will be analyzed.

4.6 The Color co-occurrence method

Using SGDM< colour co-occurrence texture analysis method is built. The easy way to describe shape is gray level co-occurrence methodology. This is done by sampling the path a little number of grey scales compared with other grey levels. The matrices obtained calculate chances that a pixel at a certain grey level will be seen at a particular displacement and angle from any other pixel which has different gray level. The function of representation of SDGM is P(I,j,d, theta) where the gray level of one location(x, y) is represented by me and the grey level of another location is represented by j at an angle theta. Only for the H image, SGDM is generated.

4.7 Feature Extraction

Once the segmentation is done various features of the affected leaf is taken into picture. The features which describe the affected parts of the leaf are colour, feature and texture. the colour features are necessary to sense background of image find out objects and state description .the most important feature is texture which is used to differentiate and to find out objects.it is strong feature which can be used in picture obtaining the features which describe texture are contrast, homogeneity, dissimilarity between regions, energy and entropy. The main feature which gives an idea about the content of the image is described by shape.

4.8 Classification

The last step in finding out leaf disease is classification.it decides a law with respect to specified features and determines classes. And it assigns each disease to those predetermined classes. The main technologies and classifier used in this step are artificial neural networks and support vector machine (SVM).

5. PROPOSED SYSTEM

In the proposed system, the farmer will acquire the pictures of affected leaf sends it to service centre via Android application The farmer will get a unique id by which he can check the respective disease which has affected to the plant. One can also get information about prevention measures.

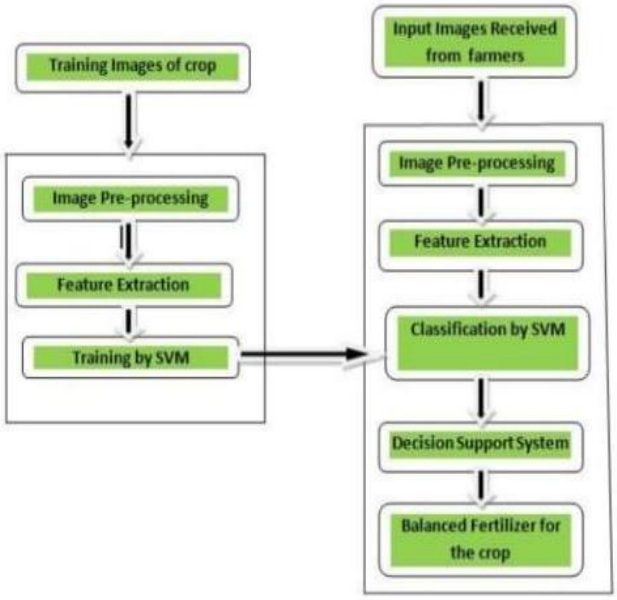

Fig. 4: Functional diagram of the proposed system

5.1 Advantages

Advantages of proposed algorithms are as follows:

(a) Use of estimators for automatic Initialization of cluster centres so there is no need for user input at the time of segmentation.

(b) Detection of diseases is made easier using proposed techniques.

(c) The proposed method is fully automatic while existing methods require user input to select the best segmentation of input image.

(d) It is the eco-friendly process of identifying diseases in plants.

6. CONCLUSION

Image processing-based approach is a useful and easy way for plant diseases detection. This paper describes different techniques used in image processing for several plant species for identifying diseases. By using the image process technique, the farmers can easily detect and diagnosis the diseased plants. In this technological world we can grow more plants, more trees, so finally the world can be happier with green plants.

7. REFERENCES

[1] Jon Traunfeld [Feb. 1997 Revised 5/2003, 7/2009] diseases of vegetables, home & garden information centre.

[2] Renato B. Bassanezi, José Belasque Junior and Cícero A. Massari: Current Situation, Management and Economic Impact of Citrus Canker In São Paulo And Minas Gerais, Brazil.

[3] Stephen Gang Wu, Forrest Sheng Bao, Eric You Xu, Yu – Xuan Wang Yi – Fan Chang[2007] A Leaf Recognition Algorithm for Classification of plant diseases Using Probabilistic Neural Network, IEEE 7th International Symposium on Signal Processing and Information Technology.

[4] M. T. Maliappis, K. P. Ferentinos, H. C. Passam and A. B. Sideridis [2008] Gims: A Web-based Greenhouse Intelligent Management System, World Journal of Agricultural Sciences 4(5):640-647.

[5] Santanu Phadikar & Jaya Sil [2008] Identification of Rice diseases with the use of Pattern Recognition Techniques, Proceedings of 11th International Conference on Computer and Information Technology, 25-27.

[6] Weizheng S., Yachun W., Zhanliang C. and Hongda W.[2008]Grading Method Of Leaf Spot Disease Based On Image Processing, Proceedings Of 2010.

[7] Krystian Mikolajczyk and Cordelia Schmid "A performance evaluation of local descriptors", Pattern Analysis and Machine Intelligence", IEEE Transactions on Pattern Analysis and Machine Intelligence, Volume 27, Issue 10, 2017, pp 1615 – 1630.

[8] Muhammad Faisal Zafar, Dzulkifli Mohamad, Muhammad Masood Anwar "Recognition of Online Isolated Handwritten Characters by Backpropagation Neural Nets Using Sub Character Primitive Features", Informatics Complex, FSKSM, Universiti Teknologi Malaysia, ©2016 IEEE.

[9] Rong Zhou, Shun'ichi Kaneko, Fumio Tanaka, Miyuki Kayamori, Motoshige Shimizu "Early Detection.

