Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X
IMPACT FACTOR: 5.258

IJCSMC, Vol. 5, Issue. 5, May 2016, pg.394 – 398

Plant Disease Prediction using Image Processing Techniques- A Review

Sujeet Varshney
Research Scholar
CBS Group of Institution, Jhajjar, Haryana

Tarun Dalal
Assistant Professor (CSE Department)
CBS Group of Institution, Jhajjar, Haryana

Abstract:

Agriculture has become much more than simply a means to feed ever growing populations. It is very important where in more than 70% population depends on agriculture in India. That means it feeds great number of people. The plant diseases effect the humans directly or indirectly by health or also economically. To detect these plant diseases we need a fast automatic way. Diseases are analyzed by different digital image processing techniques. In this paper, we have done survey on different digital image processing techniques to detect the plant diseases.

Introduction

Plants become an important source of energy and only a primary source to the problem of global warming. The damage caused by emerging, re-emerging and endemic pathogens, is important in plant systems and leads to potential loss economically. In addition, crop diseases contribute directly and indirectly to the spread of human infectious diseases and environmental damage. As these diseases are spreading worldwide causing damage to the normal functioning of the plant and also damaging the financial condition by significantly reducing the quantity of crops grown. The crop production losses its quality due to much type diseases and sometimes they occur but are even not visible with naked eyes. Farmers estimate the diseases by their experience but this is not proper way.

The main approach adopted in practice for detection and identification of plant diseases is naked eye observation of experts. The decision making capability of an expert also depends on his/her physical condition, such as fatigue and eyesight, work pressure, working conditions such as improper lighting, climate etc. That's why this is not a proper way and also time consuming. It might be expensive as continuous monitoring of experts in large farms. So, we need a fast way and remote sensing form to protect the crop from disease.

The classification and recognition of crop diseases are of the major technical and economic importance in the agricultural Industry. The main diseases of plants are viral, fungus and bacterial disease. The viral disease is due to viral changes in environment, fungus disease is due to the presence of fungus in the leaf and bacterial disease is due to presence of germs in leaf or plants. Automatic detection of plant diseases is an important research topic these days as it may prove benefits as automatically detect the diseases from the symptoms that appear on the plant leaves.

Digital Image Processing in detecting plant disease

Digital image processing is the use of computer algorithms to perform image processing on digital images. An image may be defined as a two-dimensional function, f(x, y), where x and y are spatial (plane) coordinates, and the amplitude of at any pair of coordinates (x, y) is called the intensity or grey level of the image at that point. When x, y and the intensity values of f are all finite, discrete quantities, we call image a digital image . Digital image is composed of a finite number of elements, each of which has a particular location and value. These elements are referred to as picture elements, image elements, pels, and pixels. Pixel is the term most widely used to denote the elements of a digital image. Vision is the most advanced of our senses, so it is not surprising that images play the single most important role in human perception. DIP is the use of computer algorithms to create, process, communicate, and display digital images. The input of that system is a digital image and the system process that image using efficient algorithms, and gives an image as an output. In figure 1, the process of digital image processing is defined in the form of phases.

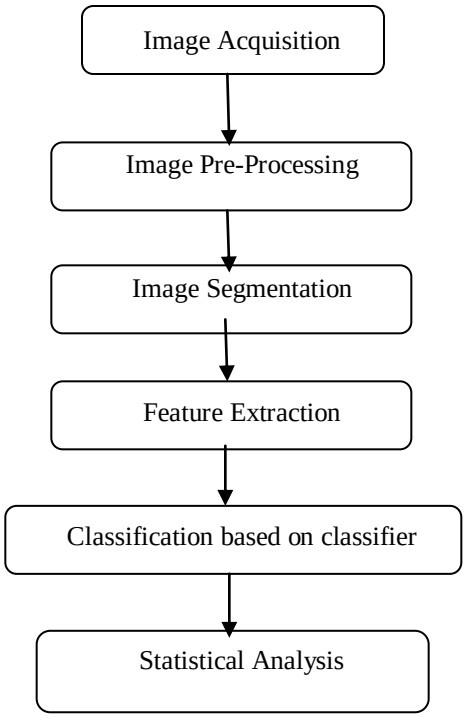

Figure1. Digital Image processing

When some diseases are not visible to naked eye but actually they are present, then it is difficult to detect it with the naked eye. And when it is visible it will be too late to detect disease and can't help anymore. Earlier, microscope is used to detect the disease, but it become difficult as to observe each and every leaf and plant. So, the fast and effective way is a remote sensing technique. Detection and recognition of diseases in plants using machine learning is very fruitful in providing symptoms of identifying diseases at its earliest. Plant pathologists can analyze the digital

images using digital image processing for diagnosis of plant diseases. Computer processing Systems are developed for agricultural applications, such as detection of leaf diseases, fruits diseases etc. In all these techniques, digital images are collected using a digital camera and image processing techniques are applied on these images to extract useful information that are necessary for further analysis. Digital Image processing is used for the implementation which will take the image as input and then perform some operation on it and then give us the required or expected output. Application of computer vision and image processing techniques certainly assist farmers in all the areas of agriculture activities.

Literature Review

Many researchers had done research in this field. Following is the related literature review of proposed work:

[1] In this paper, the combination of two methods is used to detect the infected part f disease. Firstly segmentation is done which is based on edge detection. It take the image which is RGB model as input image and then feature values will be calculated and get required output. Then image analysis will be performed and after that classifier will be applied on it.

[2] Described a software prototype system for disease detection and used image growing, image segmentation techniques on this.

[3] studied the regularization and extraction technology and describe the Eign features of this technology and this technology gives more accuracy than other detection feature technology.

[4] Studied the methods of image processing.

For that purpose they used cucumber powdery mildew, speckle and downy mildews as study Samples and to relate the details of effect of simple and medium filter.

[5] The SVM has been used for detection of feature extraction and it is 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.

[6] Recommended a k-means clustering technique for segmentation. RGB has been converted to HIS, where H is the hue, I indicate the intensity and S indicate the saturation value. Color Co-occurrence method or CCM method has been used for color feature extraction. Plant disease is detected using Histogram matching. The Threshold value for the pixel is computed using Otsu's method.

[7] Proposed Rice Disease Identification using Pattern Recognition Techniques describes a software prototype system for rice disease detection based on the infected images of various rice plants. Using digital camera images of infected rice plants are captured and using image growing, image segmentation techniques to detect infected parts of the plants. Then the classification of infected part of leaf is done by neural network.

Classification of infected part of leaf is done by neural network.

Authors	**Detection Algorithms**	**Results**
S. Phadikar & et al.	Baye's and SVM classifier , mean fiitering technique and Otsu's algorithm	Baye's – 68.1 % SVM – 79.5% accuracy
Ging Yao & et al.	. SVM method	Accuracy of 97.2 % on rice disease plant
S. Arivazhagan & et al.	Color co-occurance and SVM classifier	94% accuracy on 500 Plant leaves disease
Stephen gangWu et al.	Probablistics Neural Networks (PNN)	Accuracy of 90% on 32 kinds of plants
Smita Naikwadi & et al.	K-mean and Otsu's method	Accuracy between 83% to 94%
Ajay A. Gurjar & et al.	Eign feature Regularization and Extraction Techniques	Accuracy of 90% detection on fungal disease

CONCLUSION:

This paper provides the survey of different techniques for leaf disease detection. The main characteristics of disease detection are speed and accuracy. Hence there is working on development of fast, automatic, efficient and accurate system, which is use for detection disease on unhealthy leaf. Also Comparison of different techniques of digital image processing is done which gives the different results on different databases. Work can be extended for development of system which identifies various pests and leaf diseases also.

References:

[1] P.Revathi, M.Hemalatha, "Classification of Cotton Leaf Spot Diseases Using Image Processing Edge Detection Technique", ISBN, 2012, 169-173, IEEE.

[2] Santanu Phadikar & Jaya Sil[2008] Rice Disease Identification Using Pattern Recognition Techniques, Proceedings Of 11th International Conference On Computer And Information Technology, 25-27

[3] Ajay A. Gurjar, Viraj A. Gulhane," Disease Detection on Cotton Leaves by Eigenfeature Regularization and Extraction Technique", International Journal of Electronics, Communication & Soft Computing Science and Engineering (IJECSCSE) Volume 1, Issue 1

[4] Geng Ying, Li Miao, Yuan Yuan &Hu Zelin[2008] A Study on the Method of Image Pre-Processing for Recognition of Crop Diseases, International Conference on Advanced Computer Control, 2008 IEEE.

[5] S. Arivazhagan and R. Newlin Shebiah et al., "Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture feature", CIGR, 2013, 15(1), 211-217.

[6] Smita Naikwadi, Niket Amoda," Advances In Image Processing For Detection Of Plant Diseases," International Journal of Application or Innovation in Engineering & Management (IJAIEM), Vol2, Issue 11, November 2013.

[7] Santanu Phadikar and Jaya Sil, "Rice Disease Identification using Pattern Recognition Techniques", Proceedings of 11th International Conference on Computer and Information Technology (ICCIT 2008), 25-27 December, 2008, Khulna, Bangladesh, pg.no420- 423, (IEEE).

[8] Y. Tian, L. Wang and Q. Zhou , "Grading method of Crop disease based on Image Processing", Computer and computing technologies in agriculture 427-433, 2011

[9] Md . Mursalin and Md . Motaher Hossain et. Al, "Performance Analysis among Different Classifier Including Naive Bayes, Support Vector Machine and C4.5 for Automatic Weeds Classification", Global Journal of Computer Science and Technology Graphics & Vision, Volume 13 Issue 3 Version 1.0 Year 2013.

[10] 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, 2005, pp 1615 – 1630.

[11] 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, ©2006 IEEE

[12] Rong Zhou, Shun'ichi Kaneko, Fumio Tanaka, Miyuki Kayamori, Motoshige Shimizu "Early Detection and Continuous Quantization of Plant Disease Using Template Matching and Support Vector Machine Algorithms"2013.

[13] R. Zhou, S. Kaneko, F. Tanaja, M. Kayamori, M. Shimizu: "Matching Based Cercospora Leaf Spot in sugar beet" The 11th International Conference on Quality Control by Artificial Vision, pp.99-106. 2013.

