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Certain Investigation on Cotton Plant Diseases and Identification Methods using DIP Techniques

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1.ABSTRACT

The vast economic potentiality of the crop can be adequately established by the fact that about 20-30 million people consume cotton in India on a regular basis besides those in other countries of the world which may include over 2 billion consumers. Its cultivation is highly labour intensive and offers employment to about 2.0 million families engaged in cultivation, trading and commerce in cotton throughout India. During cultivation cotton is very much affected by disease and also procedure great loss for the farmers. It occurs in a very virulent form and if not controlled, causes widespread damage and even total destruction of the entire cotton plantations without any early indications of the diseases. The aim of this paper is to study and identify various diseases in the cotton plants and also procedure for to identify diseases early infected stage using digital image processing and pattern recognition techniques.

Keywords: Anthracnose, Leaf Red spot, Grey Mildew, Verticilium Wilt

2. Introduction

In whole world, India accounts approximately 25 percent of cotton land. Maharashtra is main cotton growing state in India. The group of research is going on in the field of cotton plants diseases analysis and control in various centers within the country under the name ""ALL INDIA NETWORKING PROJECT IN COTTON RESEARCH". During cultivation cotton is very much affected by diseases and insects that result in great loss for the farmers.

The most important diseases of cotton plants are Anthracnose disease, Leaf Red spot disease, Grey Mildew disease and Verticilium Wilt disease. It occurs in a very virulent form and if not controlled, causes widespread damage and even total destruction of the entire of cotton plantations. The cost of production of the cotton plantation is approximately Rs.1.5 lakh per hectare per year and around 50 percent of the total cost is used for maintenance, fertilizers and pesticides and insecticides. After spending such huge amounts in production, the farmer is not able to detect the disease at an early stage to initiate preventive action due to the non-availability of modern technology. So for each farmer, to have access to the modern technology there is a need to construct modern commercial farm. This has been the

base to develop a new tool to identify the isease well in advance to enhance the cultivation. MATLAB is used as a tool for early identification of the disease. The main motive of this research work is to help the agriculturists who cultivate cotton plants on commercial basis, to identify diseases which infect cotton plants at the very initial stage, so that preventive measures could be taken at an appropriate time. It also aims to enable them to arrest the negative effect of such diseases and to obtain a good harvest at the end. The objective of the research work is to develop an image processing technique which could identify the infection of the Anthracnose variety of cotton using the RGB color components through histogram analysis and neural network based algorithms.

3. Literature Review

The super pixel-based roughness measurement technique is used [1] to detecting the cotton leaf diseases. The simple linear interactive clustering method is suggested for classifying the diseases. Several different categories of leaves are clustered and region of cotton image are extracted using the support vector machine. The advanced image processing techniques are presented [2] for detect the cotton leaves diseases. The K- means clustering is used for leaf images to detect and classify the diseases. In this research paper also considers neutral network for classification the disease, which is detected by the PCA algorithm. The implemented algorithm can be suggested for detecting and classifying the disease. The genome wide identification system is proposed [3] for encoded microRNA of targets against the cotton leaf curl bure Wala virus. The identified cotton disease is encoded with miRNAs which targeting the curl virus. The cotton miRNA is twenty-one types will be functioning of curl virus associated with satellites.

The principle component analysis classifier system is presented [4] for the diagnosis of cotton leaves diseases. The implementing of PCA/KNN and multi variable techniques are used to detect the various diseases are reflected by green channel. This research paper will be recognized by photo synthesis process of cotton leaf disease at real time. The cotton leaf curl disease detection method is proposed using diversity of Alpha satellites method [5]. The several curl species are confirmed by phylogenetic analysis method. In this paper the cotton leaf curl diseases will be occurred by various types of Alpha satellite. The proposed phylogeny is based on the two Alpha satellites will be separates the species. The adopted Alpha satellites can be cultivated in the vicinities and possibly with associated with begomovirus. Edge detection based detection method is presented [6] for identifying the cotton leaf spots. The disease spots are carried out to get target regions using RGB color featured image segmentation techniques.

The real time quantitative polymerase chain reaction is used for the cotton leaf curl disease detection method [7]. The symptoms of cotton leaf diseases are classified based on satellites and virus. The two satellites are contributing the begomovirus, which can be overcoming host defenses of the RNA interference. The cotton leaves diseases under natural environment are localized using automatic image segmentation method [8]. The leaves are segmented from the background image using edge composite function and Heaviside function. The cotton leaves diseases are classified to advanced image segmentation algorithms (GAC, CV and LBF) [9]. The histogram equalization is presented for segment the affected leaf. The image can be featured by K-means clustering algorithm. Variance the data base images are performed and classified using the neutral network. The utilizing feature selection of the cotton leaf spot diseases is suggested using skew divergence method [10] to construct an EPSO

infraction of the images. The feature extraction method is used to evaluate the efficiency of the six-type cotton leaf spot diseases accurately using SVM, BPN and FUZZY method. The high accuracy values are measured when using EPSO algorithm and fuzzy classifiers. The HPCCDD algorithm [11] and snake segmentation based algorithm [12] are proposed to categorize the cotton leaf spot diseases. The disease affected spot can be identified using the pattern recognition technique.

The cotton leaf diseases are detected and classified using the OTSU thresholding technique and SVM classifier respectively in [13]. The cotton leaves disease recognition method is proposed [14] based on adaptive neutral fuzzy inference system. The three cotton leaves diseases are classified by the image segmentation method and extracted with adaptive fuzzy inference system. The feature selection is used to identify the cotton leaves disease by the significant features. The fuzzy based feature selection technique is proposed [15] to the selection of cotton diseases. The non-linear techniques are without complicated by using the significant features for identify the cotton leaves diseases. The cotton leaf diseases are identified [16] by using Gaussian filter and the image segmentation which can be used for the pattern recognition of the images.

In this paper, suggested method classifies the diseased images using neutral network and intelligent pattern recognition system. The principal component analysis classifier based method is proposed [17] to diagnosis of the cotton leaves diseases. The PCA/KNN multiple variable techniques are considered for detect the various diseases of cotton leaves using KNN method for misclassification. The cotton plant diseases are detected and severity of unconstrained images are estimated using the KNN classifiers and developed algorithm [18]. The cotton leaf diseases are used to detect for machine learning regression technique for controlling the diseases for internet of things. The cotton leaf diseases are monitoring and detected from the android app and raspberry pi. The remedies of cotton leaf diseases are controlled by the android app and the diseases are detected by SVM based regression technique.

3.1 Cercospora disease

The symptoms of this disease are reddish lesions for early stages. The lesions are centre of the leaves in purple, dark brown or blackish margin. This

Fig.1. Cercospora disease infected cotton leaf

disease affected in 20 – 30 *C. The affected lesion is irregular shape and vary in size for pale color.

3.2.Anthracnose disease

This type disease can affect the cotton leaves for the all growth stages and all

Fig.2. Anthracnose disease infected cotton leaf

Anthracnose is a one of the fungal disease tissues. The anthracnose produces the margins of the leaves in reddish, brown and black colors on the leaves. When fungus is destructive with the gosspium or glomerallagossypi. It can be affected for the humid weather of 29 – 33*C.

3.3. Bacterial blight disease

The bacterial blight is affected from leaf is bacteria for all growth stages, stem and bolls. When these diseases are affected on leafs are 1-2mm from lower surface when spots are increases in the diameter of 5mm. It's also visible for the upper surface. The water soaked, scattered small dark green, areolate spots about 1mm in cotton leaves.

Fig.3. Bacterial blight disease infected cotton leaf

3.4. Alternaria alternate disease

This disease is one of the leaf spot and fungal disease in cotton leaves. When the Alternaria over 380 host species of the plant.

Fig.4. Alternaria alternate disease infected cotton leaf

This disease is varying with the circular brown, grey and purple margins in the diameter of 1 - 10mm. The pathogen may have attacked to black appearance of lesions in stem. The mycelium of macrospora for cotton leaves can residues

4. Methodology

4.1. Histogram Analysis Based Disease Identification

For the histogram based analysis, the RGB color images of cotton leaves are converted into gray scale images. Histograms are plotted and stored in a database for healthy cotton leaves and cotton leaves infected by the Anthracnose disease for can be identified from its front and back view of all the selected variety of cotton leaves.

4.2. Neural Network Based Disease Identification

For the neural network based analysis for identification of Anthracnose disease, the RGB color images of cotton leaves are converted into gray scale images. The back propagation neural network algorithm is created. The gray scale images of healthy cotton leaves and cotton leaves infected with the Anthracnose disease is loaded and trained. Finally, the percentage of accuracy is calculated in the classification of healthy cotton leaves and cotton leaves infected.

5. Conclusions

The above proposed research work convey that the Anthracnose disease can be identified at an early stage and thus preventive action can be taken well in advance such that the entire plantation can be saved before the disease starts to spread.

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