Classification And Prediction Of Brinjal Leaf Diseases Through Image Segmentation

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Abstract— *Agriculture is the backbone of our nation. To diagnose the disease of brinjal leaf using image processing and data mining techniques. The disease on the brinjal leaf are critical issue which makes the sharp decrease in the production of brinjal. It is to introduce an independent detection and classification method to improve and accelerate the agriculturist decision-making process. The gradient filter may apply for denoising the image. In segmentation work,we use a modified version of canny Edge Detection method that does not require reinitialization. The smallest or even the most uncertain disease in the leaves are detected.Finally the image classification can be obtained through the Support Vector Machine Classifier. To improve the classification performance, an optimal synthetic feature selection algorithm by combining Genetic Algorithm (GA) and Adaboost algorithm are applied. Thus the classification results shows that the leaves may affected with diseases or not and also predicts the precautions for the affected leaves.*

Keywords— *Canny edge detection, Leaf diseases, SVM, image segmentation, classification, Threshold, image processing, Brinjal.*

I. INTRODUCTION

Weather cannot be controlled by the farmers since they lost control of most farming practices. If the farm is affectedby a pest or a disease, it is to be rectified with immediate effect without any delay. Most of the disease in plants can be identified by monitoring the leaves. Farmers used to monitor the plant at definite time intervals and if they are unable to identify the symptom of a disease, they will apply approximate quantity of fertilizer or pesticide. But normally the farmers are not in a position to identify the actual disease

deficiency. This results in the application of wrong fertilizer and finally it will affect the plant as well as the soil. The solution for this problem is to automate the process of detection of disease deficiency. It can be done with the help of various image processing techniques.

Machine learning based detection and recognition of vegetable diseases can provide clues to identify and treat the diseases in its early stages. Comparatively, visually identification of diseases is expensive, inefficient, and difficult.

India's diverse climate ensures availability of all varieties of vegetables. It ranks second in vegetables production in the world, after China. Vegetable quality is frequently attributed to size, shape, mass, firmness, color and bruises. Based on such parameters, vegetables can be classified and sorted. The diseases need to be controlled in the primary stage of the infection. Today's farmers are not able to identify the diseases at the early stages due to lack of knowledge of infections and diseases that can attack the crop. With the rapid development of computer vision and image processing technology, it is possible to improve the accuracy and efficiency of the conventional agriculture work, such as pest detection and early warning. The symptoms of diseases found on vegetable crops differ in color, shape, and size according to the cause. Machine vision techniques are used in this to solve problems of features extraction and analysis which include features of color, size, shape, and surface texture. An abnormal symptom is an indication to the presence of the disease, and hence, can be regarded as an aid in diagnosis. The first step in fighting against these symptoms is the adequate recognition of their presence which can be accurately determined by the machine vision technology.

II. MAJOR DISEASE ON BRINJAL LEAVES

The possible diseases of brinjal leaves are discussed in the section

A. Post-emergence damping-off:

The post-emergence damping off phase is characterized by infection of the young, juvenile tissues of the collar at the ground level. The infected tissues become soft and become water soaked. The collar portion rots and ultimately the seedlings

collapse and die.

B. Leaf spot (Cercospora melongenae) :

The disease symptoms are characterized by chlorotic lesion, angular to irregular in shape, later turning grayish brown. Severely infected leaves drop off prematurely, resulting in reduced fruit yield.The template is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. You may note peculiarities. For example, the head margin in this template measures proportionately more than is customary. This measurement and others are deliberate, using specifications that anticipate your paper as one part of the entire proceedings, and not as an independent document. Please do not revise any of the current designations.

C. Alternaria Leaf Spots (Altrenaria melongenae) :

The disease causes characteristic leaf spots with concentric rings. The spots are mostly irregular and coalesce to cover large areas of the leaf blade. Severely affected leaves drop off. The symptoms on the affected fruits are in the form of large deep-seated spots. The infected fruits turn yellow and drop off prematurely.

D. Fruit Rot (Phytophthora nicotianae) :

High humidity favours the development of the disease. The symptoms first appear as small watersoaked lesions on the fruit, which later enlarges in size considerably. Skin of infected fruit turns brown and develops white cottony growth.

E. Verticillium Wilt (Verticilium dahliae) :

The disease attacks the young plants as well as mature plants. The infected young plants show dwarfing and stunting due to the shortening of the internodes. Such plants do not flower and fruit. Infection after the flowering stage results in development of distorted floral buds and fruits. The affected fruits finally drop off. The infected leaves show the presence of irregularly scattered necrotic pale yellow spots over the leaf lamina. Later on, these spots coalesce resulting in complete wilting of the leaves. The roots of the affected plants are split open longitudinally, a characteristic dark brown discoloration if the xylem vessels is observed.

F. Bacterial Wilt (Psedomonas solancearum) :

Bacterial wilt disease causes severe problem in brinjal cultivation. The characteristic symptoms of the disease are wilting of the foliage followed by collapse of the entire plant. The wilting is characterized by gradual, sometimes sudden, yellowing, withering and drying of the entire plant or some of its branches.

G. Little Leaf of Brinjal:

This is a serious viral disease of brinjal. The disease is transmitted by leaf hopper (Cestius (Hishimonus) phycitis and Amrasca biguttula biguttula). The leaves of the infected plants in the early stages are light yellow in colour. The leaves show a reduction in size and are malformed. Disease affected plant are generally shorter in stature bearing a large number of branches, roots and leaves than healthy plants. The petioles get shorter considerably, many buds appear in the axil of leaves and internodes get shortened thus giving the plants a bushy appearance. Flower parts are deformed leading the plants to be sterile. Infected plants do not bear any fruit. However, if any fruit is formed it becomes hard and tough and fails to mature.

H. Tobacco mosaic virus (TMV):

Potato virus y which is spreaded by aphids and leads to a viral diseases called TMV. The mosaic mottling and stunting of plants are useful symptoms of this disease. The mosaic mottling leads to the raised dark green region areas among the leaves which are affected by this disease. So the size of leaves are reduced.

III. PROPOSED SYSTEM

First the leaf images are captured, then image processing techniques are applied to extract useful features for disease detection. The block diagram of the proposed methodology is shown in Fig. 1.

I. Image Analysis

For diseases detection image of an infected leaf should be examined through the set of procedures. The input image should be pre-processed then its feature should be extracted according to the dataset. After then some classifier techniques should be used to classify the diseases according to the specific data set .

J. Image Acquisition :

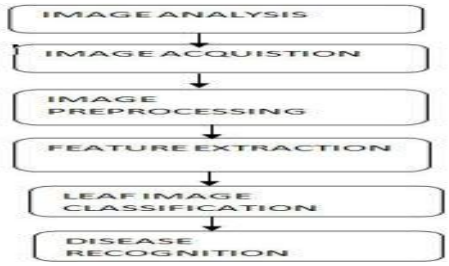
Image acquisition is the process in which acquired and converted to the desired output format. For this application an analog image is first captured and then converted to the digital image for further processing.

K. Image pre-processing

The following pre-processing steps are performed on the acquired image. Increase the contrast of the image by still or active binarisation, look-up tables or image plane separation. Decrease the image resolution decrease via binning. Image rotation. Convert color images to gray scale images.

L. Feature Extraction :

The aim of this phase is to extract features such as color and shape. Two shape features such as area and perimeter are extracted from the binary segmentation images. Color features are extracted from color segmentation images. The color features include mean of gray values of R/G/B component, variance of gray values of R/G/B component, skewness of gray values of R/G/B component, color ratio in RGB color model, mean of gray values of H/S/V component, variance of gray values of H/S/V component, and skewness of gray values of H/S/V.



M. Leaf Image Classification :

For classification between the affected leaves, SVM were used for classification and differences between the affected leaves . The image of disease affected leaf is depicted .First the captured images are classified as affected and unaffected leaves. Distribution of color is the same for unaffected leaves, but for the affected leaves the distribution of color is not uniform. This is because the values of the pixels of the affected leaves were totally different form the pixel values from the normal leaves. The image quality is improved by applying the mean filter after that Segmentation of the image is performed by canny edge detection algorithm.

Fig.2. Disease affected leaf image

After extracting the features from the given leaf image, a recognizer is needed to recognize the disease in the leaf image from the stored database. Support Vector Machine (SVM) is a supervised machine learning algorithm which can be used for classification. In this algorithm, we plot each data item as a point in n-dimensional space (where n is number of features you have) with the value of each leaf feature.As with any supervised learning model, support vector machine is trained, and then the trained machine is used to classify (predict) new data.

IV. FUTURE ENHANCEMENT

This work elaborates the possible disease of brinjal and a method to identify the diseases which is not attempted yet. The leaf spot disease is considered in this work and it is possible to identify the disease using k-means clustering algorithm and ANN. Various parameters are computed as Area, Perimeter, Centroid, Diameter and Mean Intensity for identifying a brinjal diseases. This work has to be extended to identify all possible diseases as discussed in section 2.

V. CONCLUSION

In the present paper, a review on the recent trends in the field of detection of vegetable disease using digital image processing techniques has been outlined. The paper discusses the goals, methodology, content and results in each of the research work along with the future research directions for the improvements. Finally the overall improvements in the previous research work have been suggested in the context of detecting diseases in vegetables using image processing techniques.

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