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# A Review on Plants and Food Grains Disease Detection and Quality Checking using Image Mining Techniques

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**ABSTRACT** :India is an agricultural country. Farmers have wide range of diversity to select suitable fruit and vegetable or food grains crop. Scientists of 21st century are exploring how genetic diversity and ecological sensitivity are necessary in solving problems such as feeding the population and fighting disease. Plants, Fruits and Food grains play important role in human life. This paper studies about the various research works done in the plant leaf based disease detection, fruits or food grains quality checking based on the image processing and image mining classifiers and techniques.

**KEYWORDS** : Segmentation, Feature Extraction, leaf disease detection, food grain quality

## I. INTRODUCTION

Globally, it has been found that there are more than 1.7 million species of living organisms (human beings, plants and algae) on Earth, out of which, plants species plays a vital role in human life. Plants are an essential resource for human well-being and can exist everywhere. Most of the plants carry significant information for the development of human society and are considered as essential resource for human well-being. Plants are of plenty of use as they form the base for food chain and a lot of medicines are derived from plants. Plants are also vitally important for environmental protection.

Even after several innovative advancements made in the field of botany, there are still a huge number of plants that are yet to be discovered, identified and used. It is a well-known fact that unknown plants are treasures waiting to be found. Today's ethno-botanists are combining regions of the world, looking for future medicines and agricultural products.

The functional characteristics and the association of plants within ecosystems are explored by them in order to understand the need for diversity to manage the plant resources.

Research work develops the advance computing system to identify the diseases or verify the quality of fruits or grains using infected images of various leaf spots. Images are captured by digital camera mobile and processed using image growing, then the part of the leaf spot has been used for the classification purpose of the train and test. The technique evolved into the system is both image processing techniques.

Most leaf diseases or quality of grains are caused by fungi, bacteria and viruses. Fungi are identified primarily from their morphology, with emphasis placed on their reproductive structures. Bacteria are considered more primitive than fungi and generally have simpler life cycles. With new expectations, bacteria exist s single cells and increase in numbers by dividing into two cells during a process called binary fission viruses are extremely tiny particles consisting of protein and genetic material with no associated protein.

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The detection of plant leaf or fruits or grains is an very important factor to prevent serious outbreak. Automatic detection of plant disease or infected fruits or quality of grains is essential research topic. The term disease or quality is usually used only for the destruction of live plants.

Two main plant or food grains or fruits aspects of plant taxonomy that play a vital role in these endeavours are the identification and classification of plants.

- **Identification** is the determination of the identity of an unknown plant or food grains or fruits in comparison with previously collected specimen. The process of recognition connects the specimen with a botanical name. Once this connection is established, related details like name and other properties of the plant can be easily obtained.
- **Classification** is the placing of known plants or fruits or food grains into groups or categories to show some relationship. They use features that can be used to group plants or fruits for food grains into a known hierarchy.

Basic work flow of the plant disease or grains quality prediction in image processing as follows

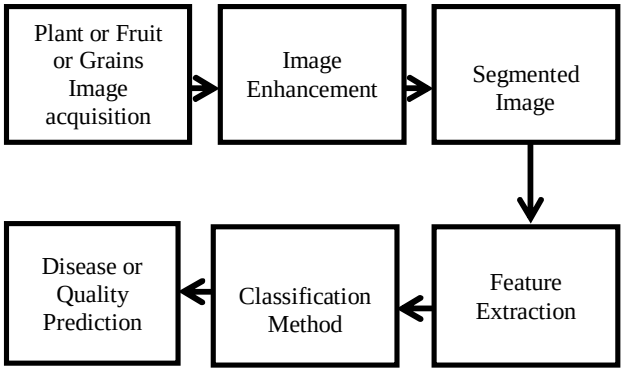


Fig.1. Overall framework

Image enhancement like noise removal, contrast enhancement, Edge detection and Segmentation, feature extraction and analyses the extracted features using classifier are the main processing tasks in the image processing to detect the diseases in leafs and food grains quality verification.

## II.LITERATURE REVIEW

The papers which are used to detect the leaf disease using various methods are as follows:

**P. Revathi et al [1],** proposed cotton plant disease detection system using homogeneous pixel counting and edge detection technique**.** The goal of this research work is identify the disease affected part of cotton leaf sport by using the image analysis technique. This work find out the computer systems which analyse the input images using the RGB pixel counting values features used and identify disease wise and next using homogenization techniques Sobel and Canny using edge detection to identify the affected parts of the leaf spot to recognize the diseases boundary is white lighting and then result is recognition of the diseases as output.

**H.Ai-Hiary et al [2]** proposedthree fold method to detect leaf diseases. In the first fold identifying the infected object based upon k-means clustering; in the second fold extracting the features set of the infected objects using color co-occurrence methodology for texture analysis; and finally detecting and classifying the type of disease using NNs, moreover, the presented scheme classifies the plant leaves into infected and not-infected classes. The image is segmented using K-Means clustering technique. Otsu method is used to mark mostly green pixels. are masked as follows: if the green The pixels with zeros red, green and blue values and the pixels on the boundaries of the infected cluster were completely removed. Next in the infected cluster was then converted from RGB format to HIS format and SGDM matrices the texture statistics for each image were generated. The texture features for the segmented infected

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object in this phase are calculated. Finally, the recognition process was performed to the extracted features through a pre-trained neural network.

**PiyushChaudharyet al.[3]** In this paper a comparison of the effect of CIELAB, HSI and YCbCrcolor space in the process of disease spot detection is done. Median filter is used for image smoothing. Finallythreshold can be calculated by applying Otsu method on color component to detect the disease spot. Disease spots are segmented by applying Otsu threshold on "A" component of filtered LAB color space. All these color models are compared and finally "A" component of CIELAB color model is used.

**S. Arivazhagan et al [4],** proposed four main steps for color transformation structure for the input RG, image is created, and then the green pixels are masked and removed using specific threshold value followed by segmentation process, computing the texture features using color co-occurrence method for the useful segments, finally the extracted feature are passed through the classifier. Support vector machines are a set of related supervised learning method used for classification and regression. By this method, the plant diseases can be identified at initial stage itself and the pest control tools can be used to solve pest problems while minimizing risks to people and the environment.

**ShenWeizheng [5],** proposed Otsu method and sobel operator to examine the leaf disease. The process of image segmentation was analysed and leaf region was segmented by using Otsu method. In the HSI color system, H component was chosen to segment disease spot to reduce the disturbance of illumination changes and the vein. Then disease spot regions were segmented by using Sobel operator to examine disease spot edges. Finally plant diseases are graded by calculating the quotient of disease spot and leaf areas.

**Mrunalini R et at [6],** proposed Otsu method and K-Means clustering for feature extraction and comparison of two techniques. Both are used to identify a finite set of categories termed clusters to describe the data.

**Joanna et al [7]** describes the segmentation consist in image conversion to HSV color space and fuzzy c-means clustering in hue-saturation space to distinguish several pixel classes. These classes are then merged at the interactive stage into two final classes, where one of them determines the searched diseased areas.

**KulkarniAnand H [8],** presents a methodology for early and accurately plant diseases detection, using artificial neural network (ANN) and diverse 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%. An ANN based classifier classifies different plant diseases and uses the combination of textures, color and features to recognize those diseases

**Vijayaraghavan V et al [9],** stated that a support vector machine is a very potential AI method and can apply extensively to solve classification problems. The SVM which is used to solve regression problems is known as support vector regression (SVR). SVR is very popular among researchers for providing generalization ability to the solution model. The manifestation of pathogens in plantations is the one of the most important cause of losses in many crops.

**Bernardes [10]** give the method of the automatic classification of cotton diseases based on the feature extraction of foliar symptoms from digital images. For the feature extraction this method uses the energy of the wavelet transform and a SVM for the actual classification.

**N.S. Visenet al.[**11] proposed algorithms to acquire and process color images of bulk grain samples of five grain types, namely oats, barley, rye, wheat, and durum wheat. The developed algorithms were used to extract over 150 color and textural features. A back propagation neural network-based classifier was developed to identify the unknown grain types. The color and textural features were presented to the neural network for training purposes. The trained network was then used to identify the unknown grain types. Classification accuracies of over 98% were obtained for all grain types. Better Accuracy was gained for these grain type samples.

**Harpreet Kaur, et al.,[**12] proposed a machine algorithm to grade (Premium, Grade A, Grade B and Grade C) the rice kernels using Multi-Class SVM. Maximum Variance method was applied to extract the rice kernels from background, then, after the chalk has been extracted from rice. The percentage of Head rice, broken rice and Brewers in rice samples were determined using ten geometric features. Multi-Class SVM classified the rice kernel by examining the Shape, Chalkiness and Percentage of Broken (Head Rice, Broken and Brewers) kernels. The SVM classify accurately more than 86% .Based on the results, it was concluded that the system was enough to use for classifying and grading the different varieties of rice grains based on their interior and exterior quality.

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**Anami B.S, et al.** [13] have developed a Neural network approach to classify single grain kernel of different grains like wheat, maize, groundnut, red gram, green gram and black gram based on color, area covered, height and width. The minimum and maximum classification accuracies are 80% and 90% respectively.

**Megha R [14],** proposes a model that uses color and geometrical features as attributes for classification. The grading of rice sample is done according to the size of the grain kernel and presence of impurities. A good classification accuracy is achieved using only 6 features, i.e. mean of RGB colors and 3 geometrical features. The total success rate of type identification is 98% and total success rate of quality analysis and grading of rice is 90% and 92% respectively.

## III. CONCLUSION

Most of the research works based on the Otsu method for segmentation in plant leaf disease detection. Image enhancement like noise removal, contrast enhancement, Edge detection and Segmentation, feature extraction and analyses the extracted features are the main processing tasks in the image processing to detect the diseases in leafs and food grains quality verification.

Our work focus the Indian food grains like green grams, black gram and dhal varieties quality checking process based on the Thershold based segmentation and SVM classifier.

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