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# A Review on Plant Disease Detection using Machine Learning

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***Abstract:*** *Our country mainly depends on agriculture for its economic growth. It is the only source of income for the farmers in our country. It is necessary to early diagnose the disease in crops to prevent the huge loss for the farmers, crops get affected by both the bacterial and fungal disease the leaves in plants shows the disease at an early stage in the crops. Hence, an automated system that detects the disease in the leaves would be of great help to the farmers. This type of system gives the information to the farmers at the right time and take necessary precaution.*

***Key Word:*** *Plant disease detection, Dataset, Image Processing Method, Machine Learning Technique, Classification Techniques.*

## I. INTRODUCTION

Farming is one of the predominant occupations in India. Agriculture is essential to the economic system of all countries. The use of chemical way damages the plant and the surrounding environment. In addition, this form of approach intensifies the price of manufacturing and primary financial loss to farmers. Early discovery of sicknesses as they arise is the most critical length for green sickness management. Manual sickness detection thru human professionals to become aware of and understand plant sicknesses is a traditional exercise in agriculture. With the enhancements in technology, automated detection of plant diseases from raw photographs is viable through computer vision and artificial intelligence research. A computerized tool that could turn out to be aware of the diseases in plants may be of brilliant help to the farmers. This tool may additionally moreover act as a tool to inform the farmers on the right time and take crucial precautions.

Various diseases that affect the plant can reason damage to plant elements like a leaf, fruit, seed, etc. These diseases are particular to exclusive frame elements of the plant. Leaves are the maximum essential part of the plant. If the leaf of the plant is tormented by ailment, it immediately disturbs the plants' cycle. The diseases which might be normally affecting the leaves are bacterial ailment, fungal ailment, etc. Hence, the early detection of plant ailment is crucial.

Image processing strategies at the moment are usually employed in agriculture and it's far carried out for the detection and recognition of weeds, fruit-grading, figuring out and calculating ailment infestations of plants, and plant genomics. Several machine learning (ML) algorithms are proposed to mechanically become aware of and classify plant diseases from virtual plant photos. To deal bravely with those diseases, it's far essential to install a device that mechanically acknowledges and classifies the diseases. Resolving this issue, ML is in all likelihood to be a great option. Several ML strategies have these days been proposed for the identity and type of plant diseases from plant photos. Such automatic equipment has solved the problem, however, the larger project lies with inside the consistency and robustness of the outcomes of the assessment achieved. This paper uses ML techniques for the detection of plant ailments.

## II. MATERIAL AND METHODS

Dataset Collection- Most of the datasets taken by authors, were taken either from the internet. And first few images from the dataset were taken and the features interacted from those images. The images from the leaf of the plant were captured. The images taken were in RGB form.

Image pre-processing - Pre-processed images, the pre-processing technique was used to remove any kind of noise enhance image features to its needed color scale. Image size was reduced and the images were cropped to a given input and the contrast of the image is increased by mapping input intensity to a new value.

Feature Extraction - This step of feature extraction is crucial for the classification of images in ML. So, in this many techniques are used to detect features, such as shape, edges, or motion in a digital. It helps to reduce the amount of redundant data from the dataset. GLCM techniques were used by the author to interact features. Some of the features that were extracted from the images using GLCM are contrast, correlation, energy, and homogeneity. Other features such as, mean, standard deviation, entropy, RMS, variance, smoothness, and skewness were extracted using MATLAB commands.

Various Feature extraction techniques are-GLCM, Edge Detection, Color Feature, SIFT, Texture Feature, PCA, Shape, Feature, and DWT.

Clustering and Classification

Clustering is the task of dividing the population or data points into several groups such that data points in the same groups

are more similar to other data points in the same group and dissimilar to the data points in other groups. It is a collection of objects based on similarity and dissimilarity between them.
Clustering algorithms are a powerful technique for machine learning on unsupervised data. The most common algorithms in machine learning are hierarchical clustering and K-Means clustering. These two algorithms are incredibly powerful when applied to different machine learning problems.
The data was classified into k disjoint numbers of clusters. At the initial stage, the input image was converted into LAB space K-means method was used. Two steps are-

1)Initially, it finds k centroids.
2)In the next step measure of the distance were taken.

Classification is a supervised learning algorithm where a training set is labeled data. The model learned from training data to identify the category/class of the input feature/data is called a classifier. The classifier can be a binary classifier or a multi-class classifier.
For classification purposes, SVM was used. Support Vector Machine (SVM)was used as a classifier for the classification. It is a binary classifier that uses a hyperplane.

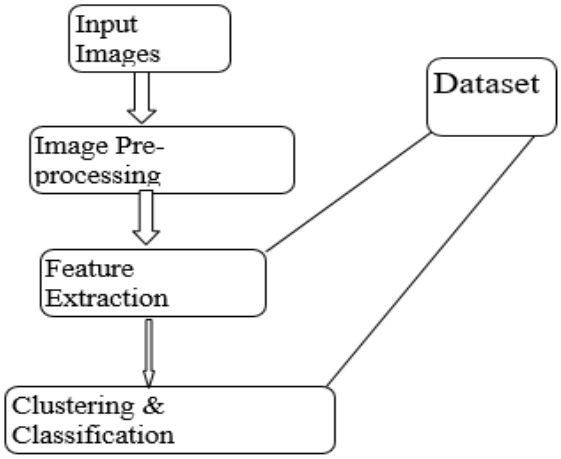


*Figure 1: Flow Chart of the expected method*

## III. RESULT

This paper uses ML techniques for the detection of plant ailments. The images from net are used as a dataset for training purposes. First few pictures from this dataset is taken and features are extracted from those pix. The images were classified.

## IV. CONCLUSION

Farming is the most crucial sector for fulfilling a country's basic needs and supporting its economy. Thus, today technology is used for improvement in this sector. Farmers were facing difficulties in identifying the diseases in plants themselves. So, it is beneficial for them to have an automated mechanism to identify the diseases in the plant. In this era of technology, the trained model is used to test real-time images to early detect and recognize plant diseases.

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