

# PLANT DISEASE DETECTION USING MACHINE LEARNING

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**Abstract:** Plant is exposed to many attacks from various micro-organism, bacterial disease and pests. The symptoms of the attacks are usually distinguished through the leaves, stem or fruit inspection. Disease that are commonly attack plants are Powdery Mildew and Leaf Blight and it may cause severe damaged if not controlled in early stages. Image processing has widely being used for identification, detection, grading and quality inspection in the agriculture field. Detection and identification disease of a plant is very important especially, in producing a high-quality fruit. Leaves of a plant can be used to determine the health status of that plant. The objective of this work is to develop a system that capable to detect and identify the type of disease based on Blobs Detection and Statistical Analysis. A total 45 sample leaves images from different colour and type were used and the accuracy is analysed. The Blobs Detection technique are used to detect the healthiness of plant leaves. While Statistical Analysis is used by calculating the Standard Deviation and Mean value to identify the type disease. Result is compared with manual inspection and it is found that the system has 86% in accuracy compared to manual detection process.

## I. INTRODUCTION

The use of technology in the detection and analysis process increases the accuracy and reliability of these processes. For example, the people who use the latest technology to analyze the diseases that arise unexpectedly are at a higher chance of controlling them than those that do not. In the recent occurrence of coronavirus, the world relied on the latest technology to develop preventive measures that have helped reduce the rate at which the disease is transmitted. Crop diseases are a significant threat to human existence because they are likely to lead to droughts and famines. They also cause substantial losses in cases where farming is done for commercial purposes. The use of computer vision (CV) and machine learning (ML) could improve the detection and fighting of diseases. Computer vision is a form of artificial intelligence (AI) that involves using computers to understand and identify objects. It is primarily applied in testing drivers, parking, and driving of self-driven vehicles and now in medical processes to detect and analyze objects. Computer vision helps increase the accuracy of disease protection in plants, making it easy to have food security.

## II. LITERATURE SURVEY

Paper [1] presents classification and detection techniques that can be used for plant leaf disease classification. Here preprocess is done before feature extraction. RGB images are converted into white and then converted into grey level image to extract the image of vein from each leaf. Then basic Morphological functions are applied on the image. Then the image is converted into binary image. After that if binary pixel value is 0 its converted to corresponding RGB image value. Finally by using pearson correlation and Dominating feature set and Naïve Bayesian classifier disease is detected.

The paper [2] presents the technique of detecting jute plant disease using image processing. Image is captured and then it is realized to match the size of the image to be stored in the database. Then the image is enhanced in quality and noises are removed. Hue based segmentation is applied on the image with customized thresholding formula. Then the image is converted into HSV from RGB as it helps extracting region of interest. This approach proposed can significantly support detecting stem oriented diseases for jute plant.

### III. EXISTING SYSTEM

1. To find out whether the leaf is diseased or healthy, certain steps must be followed. i.e., Preprocessing, Feature extraction, Training of classifier and Classification.
2. Preprocessing of image, is bringing all the images size to a reduced uniform size. Then comes extracting features of a preprocessed image which is done with the help of HOG.
3. HOG is a feature descriptor used for object detection. In this feature descriptor the appearance of the object and the outline of the image is described by its intensity gradient. One of the disadvantages of HOG feature extraction is that it operates on the cells created. Any transformations doesn't affect this. Here we made use of three feature descriptors.

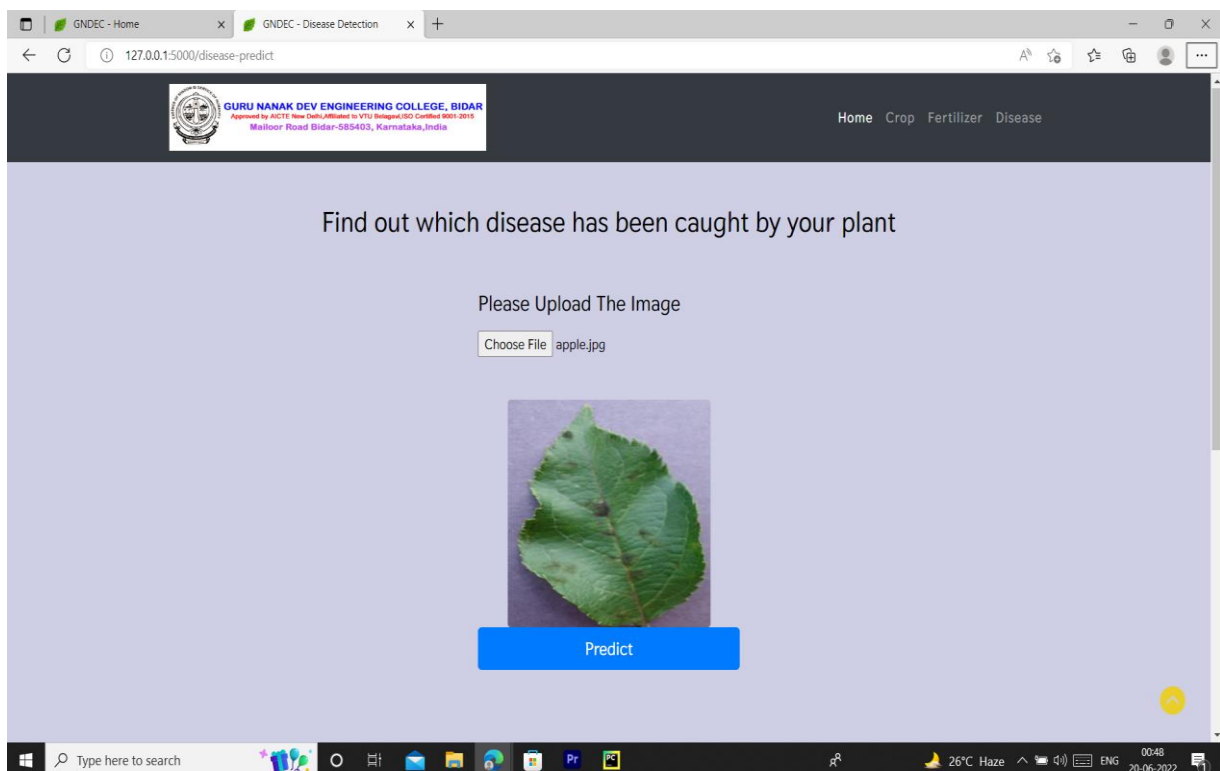
### IV. OBJECTIVE

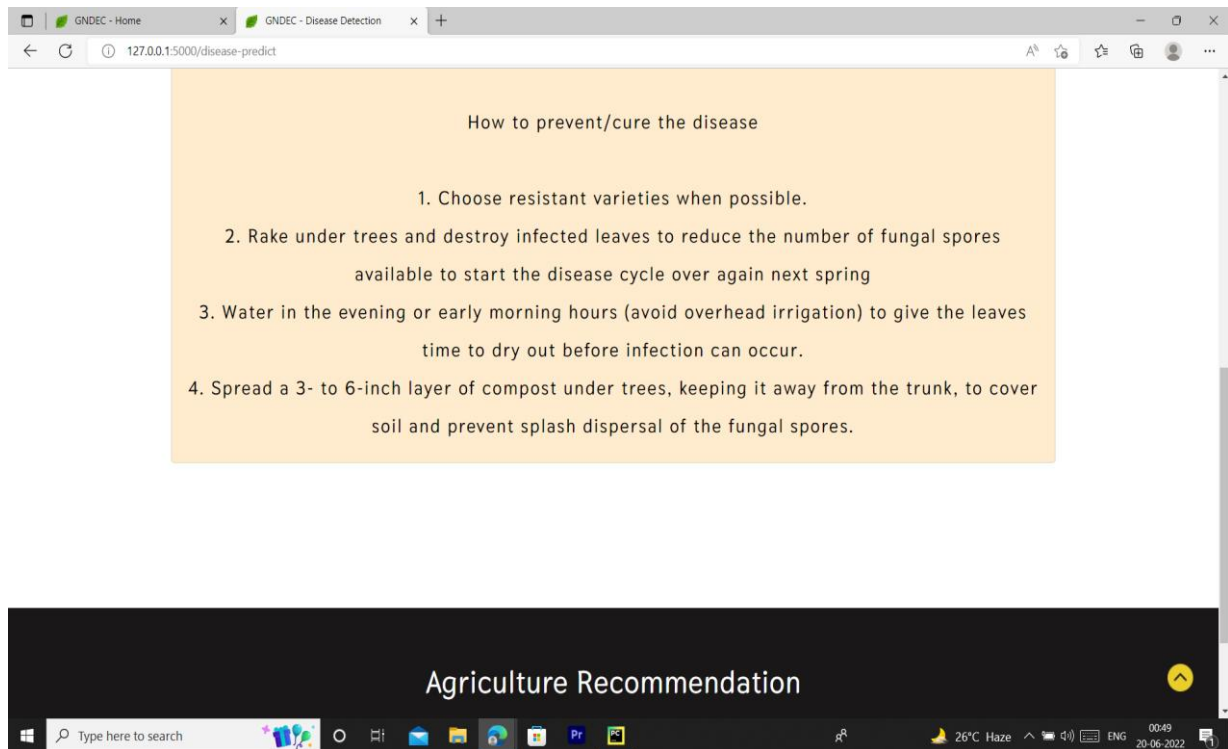
Leaves of a plant can be used to determine the health status of that plant. The objective of this work is to develop a system that is capable to detect and identify the type of disease based on Statistical Analysis.

### V. IMAGE PROCESSING

Digital Image Processing (DIP) is a software which is used to manipulate the digital images by the use of computer system. It is also used to enhance the images, to get some important information from it. For example: Adobe Photoshop, MATLAB, etc. It is also used in the conversion of signals from an image sensor into the digital images. A certain number of algorithms are used in image processing.

### VI. PLANT DISEASE DETECTION USING MACHINE LEARNING

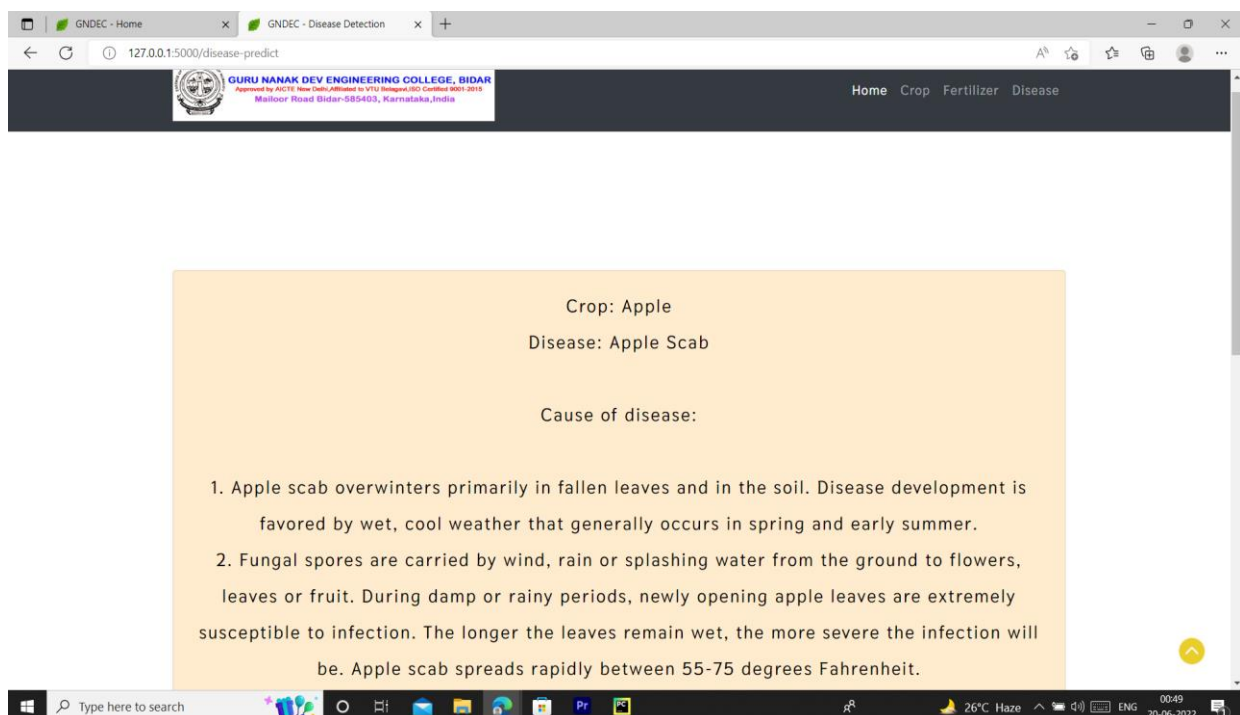




How to prevent/cure the disease

1. Choose resistant varieties when possible.
2. Rake under trees and destroy infected leaves to reduce the number of fungal spores available to start the disease cycle over again next spring
3. Water in the evening or early morning hours (avoid overhead irrigation) to give the leaves time to dry out before infection can occur.
4. Spread a 3- to 6-inch layer of compost under trees, keeping it away from the trunk, to cover soil and prevent splash dispersal of the fungal spores.

Agriculture Recommendation



Crop: Apple  
Disease: Apple Scab

Cause of disease:

1. Apple scab overwinters primarily in fallen leaves and in the soil. Disease development is favored by wet, cool weather that generally occurs in spring and early summer.
2. Fungal spores are carried by wind, rain or splashing water from the ground to flowers, leaves or fruit. During damp or rainy periods, newly opening apple leaves are extremely susceptible to infection. The longer the leaves remain wet, the more severe the infection will be.
3. Apple scab spreads rapidly between 55-75 degrees Fahrenheit.

## VII. CONCLUSION

There are number of ways by which we can detect disease of plants and suggest remedies for them. Each has some pros as well as limitations. On one hand visual analysis is least expensive and simple method, it is not as efficient and reliable. Image processing is a technique which is most spoken for very high accuracy and least time consumption are major advantages offered. The applications of K-means clustering and Neural Networks (NNs) have been formulated for clustering and classification of diseases that effect on plant leaves. Recognizing the disease accurately and efficiently is mainly the purpose of the proposed approach. The experimental results indicate that the proposed

approach is a valuable approach, which can significantly support an accurate detection of leaf diseases in a little computational effort. Alongside the supply of cultivation tools, the farmers also need access to accurate information that they can use for efficient crop management and there is no better way than providing them a service that they can use through the software.

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