


# Chapter 19

# Machine Learning–Based Pomegranate Disease Detection and Treatment

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## **ABSTRACT**

*There are two components to the assignment of pomegranate disease detection. A neural network model is created in the first part of the process, which includes image acquisition, labelling, segmentation, resizing, image stacking, and label stacking. The model is then trained using database images. The second component of the framework uses the developed model to predict image classification. The framework is implemented using a pomegranate leaf disease image dataset that is split into training and test sets. The suggested approach to solving the issue depends on creating machine learning-ml algorithm and ANN building blocks during the implementation phase.*

## **INTRODUCTION**

India and other tropical nations benefit greatly from agriculture by Wale (2019). Unfavourable changes in the climate are raising the risk to the farming system along with its productivity. India is a nation that relies heavily on agriculture. The primary economic sector for a nation's development is agriculture. Approximately 70% of Indians rely on agriculture alongside its associated businesses for their financial well-being. Agriculture is a major factor in the nation's economy's growth by Kazi (2022). Thus, in order to boost production, the government is concentrating on this

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area. The production and quality of agricultural products are impacted by bacterial diseases and changing climates, which also have an impact on import and export of the country. Therefore, the agricultural department's top priority is to establish a local organisation that can aid in the early detection of diseases. Early detection of plant diseases helps to minimise damage, lower production costs, and increase revenue because prevention is always preferable to treatment by Sunil Kumar (2022).

Farmers used to follow expert observations and advice regarding various plant diseases and their treatments, especially in remote areas. Due to the person's limited ability to reach every farm and farmer, the method has limitations. Currently, plant diseases in India are identified and treated by experts, and their detection is based on simple observations. The process of identifying crop diseases and recommending the best course of action to avoid crop damage takes time. Finding a reliable exporter is challenging, and the lengthy travel time required to diagnose and treat diseases makes the disease identification method ineffective for the vast geographic area by Pardeshi (2022). This approach is costly and time-consuming because it necessitates constant observation for accurate identification.

Living and nonliving agents are the two main causes of diseases found in agricultural products. Insects, fungi, bacteria, and various viruses are examples of living agents by Gouse (2018). Excessive moisture, temperature fluctuations, a lack of nutrients, inadequate lighting, and various pollutants are examples of non-living agents by Kamuni (2022). Researchers in the field of agriculture have created numerous applications for identifying leaves, detecting diseases in leaves, identifying fruit diseases, etc.

Due to a lack of extensive experience with different patterns and strains of the same plant disease, mixed symptoms can occasionally cause agricultural experts to misidentify the disease by Pradeepa (2022). With the use of technology, we can create a method for disease detection that is quick, automatic, affordable, and accurate. By implementing smart farming, we can assist farmers in controlling or mitigating crop production loss as well as increasing crop production. One subset of artificial intelligence is machine learning by Liyakat (2023), & Sayyad (2023). It primarily focuses on learning from experience and making predictions based on system design. In order to find patterns in the data, the learning process involves gathering of data, such as firsthand experience. Recently, methods based on machine learning have been applied to the detection of plant diseases. In these methods, images of the disease are taken, processed, and the data required for analysis is obtained by Kazi (2022; 2023) & Kutub (2022).

In our study, we suggest using technology to detect pomegranate plant diseases. We have chosen to use image processing to detect disease in pomegranate leaves and their fruit. These days, crop infection and decreased crop productivity are caused by the widespread infection of Bacterial Blight. The majority of pomegranate har-

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