

## Disease Detection in Coffee Plants Using Computer Vision

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### Abstract

Coffee is one of the most widely consumed beverages and an essential crop for many economies. Numerous diseases affect coffee plants, causing significant crop loss. The detection of plant diseases is done only through naked-eye observation and the farmers used to consult the experts, which is time-consuming. For crop losses to be kept to a minimum, early detection of these diseases is essential. This research suggests a technique that makes use of Convolutional Neural Networks (CNN). The suggested method entails gathering a dataset of coffee plants, pre-processing the images to improve the quality of the images, and training a CNN model. CNN develops the ability to automatically recognize patterns. After training, the model can identify diseases. Our goal is to develop a mobile application that can identify diseases in coffee plants. This app will provide farmers with timely and accurate details about diseases. The objectives of this study include training a CNN model and comparing its performance to existing approaches. Demonstrate CNN's ability to overcome the limitations of existing approaches through experimentation and validation and provide better accuracy and efficiency in disease detection across a variety of coffee plants. Our proposed model with CNN three-layer classifier with a 0.01 learning rate achieved an overall classification accuracy of 0.89% with the 28<sup>th</sup> iteration of the training process out of a total of 100 planned epochs. This research utilizes the capability of CNNs to construct automated systems for identifying coffee plant diseases, ultimately assisting in sustainable coffee production, and securing the livelihoods of coffee producers.

**Keywords:** *Convolutional Neural Network, Coffee leaf disease detection, Artificial Intelligence*