

A Study on the Performance of Deep Learning Models for Leaf Disease Detection

G. Sucharitha^{1,*}, M. Sirisha², K. Pravalika³ and K. Navya Gayathri³

¹Department of Data Science, Institute of Aeronautical Engineering College, Hyderabad, Telangana

^{2,3,4}Department of Computer Science and Engineering, Institute of Aeronautical Engineering College, Hyderabad, Telangana

Abstract

The backbone of our Indian economy is agriculture. Plant diseases are a key contributor to substantial reductions in crop quality and quantity. Finding leaf diseases is a crucial job in the study of plant pathology. So, Deep learning models are essential for classification objectives with positive outcomes. Many different methods have been employed in recent years to classify plant diseases. This work has aided in identifying and categorizing a plant leaf disease. Images of Tomato, Potato, and Pepper plant leaves from the PlantVillage Database, which includes fifteen disease classifications, were used in this study. The pre-trained Deep learning models like InceptionV3, MobileNet, DenseNet121, Inception-ResNetV2, and ResNet152V2 are utilized to diagnose leaf diseases. The classification of both healthy and various sorts of leaf illnesses is taught to deep learning models.

Keywords: InceptionV3, MobileNet, DenseNet121, Inception-ResNetV2, leaf Disease, Pretrained models, ResNet152V2, Classification

Received on 29 December 2023, accepted on 08 December 2023, published on 13 December 2023

Copyright © 2023 G. Sucharitha *et al.*, licensed to EAI. This is an open access article distributed under the terms of the [CC BY-NC-SA 4.0](#), which permits copying, redistributing, remixing, transformation, and building upon the material in any medium so long as the original work is properly cited.

doi: 10.4108/eetiot.4592

1. Introduction

Over two-thirds of the population in emerging countries rely on agriculture as their main source of income, making it one of a nation most important economic driver. The economy is crucially influenced by the weather other environmental conditions that affect the quality of agricultural goods. Therefore, the first step in ensuring higher food quality is safeguarding the plants that produce it against disease. It is very typical for the plant to have a condition that could be viral or fungal. Plant disease is one of the most recognized symptoms of loss of product quality. The plant's yield could suffer significantly from the sickness, both in terms of quantity and quality. Early activities rely on time- and money-consuming traditional approaches. When plant illnesses are discovered, farmers frequently use chemical fertilizers to stop the disease's spread. Alternatives include using organic fertilizers, which are safe for both crops and people who come

in contact with them. A lot of machine learning and image processing techniques have recently been applied for classification. Deep learning approaches have increased the classification's performance.

Deep learning networks can automatically classify a plant leaf. Time is saved, and less manual labour is required. It all depends on how many leaves from the crop have the disease in them. The diseases of the tomato, potato, and pepper plants as well as the health category and diseases in Indian states were chosen for the study in this article from the PlantVillage database. In total, fifteen classes of tomato, potato, and pepper are considered in this work. Algorithms like segmentation and feature extraction are utilized in the methods for diagnosing plant diseases from photos of its leaves. [1]. The four main steps of the proposed processing approach are: creating a colour transformation structure for the input RGB image; segmenting; computing the texture statistics for the user segments; masking and removing the

*Corresponding author. Email: sucharithasu@gmail.com

