Medicinal plant identification and plant disease classification

Presentation · March 2023

CITATIONS
0

READS
1,174

2 authors, including:

M M V Senanayake
University of Sri Jayewardenepura
2 PUBLICATIONS **9** CITATIONS

SEE PROFILE

Abstract No: SO-04

Medicinal plant identification and plant disease classification

M. M. V. Senanayake[1*] and N. M. T. De Silva[2]

[1]University of Kelaniya, Sri Lanka
[2]Department of Statistics and Computer Science, University of Kelaniya, Sri Lanka
maheshikamedhavi@gmail.com*

Today, with the development of technology, most manual methods are replaced by automated computer systems to ease the lives of human beings. Plant identification and disease classification are two major agricultural research areas focusing on introducing computerized systems rather than manual methods. Many researchers used various identification and classification techniques to identify and classify plants and diseases using computer-based systems because human classification errors lead to risk and high costs. When it comes to medicinal plants, most people recognize them by their knowledge and experience. But there is a lack of people who know how to identify those valuable plants. Therefore, most of the time, it needs an expert in the field for the correct identification of medicinal plants and diseases. In this study, a medicinal plant identification and disease classification system is implemented, which can help any person who needs support in identifying medicinal plants and classifying diseased medicinal plants. This study targeted the design of herbal plant identification and classification of diseased leaves, with improvements to the existing systems. This work consists of two parts: medicinal plant identification and medicinal plant disease classification. Medicinal plant leaf images were taken as input for the models of this study. There is no standard database for medicinal plants in Sri Lanka. Thus, two datasets were collected separately for medicinal plant identification (dataset 1) and their disease classification (dataset 2). Each dataset consists of images of five different medicinal plants. But finding the diseased leaf images of plants was challenging and all the collected images of medicinal plant diseases for this research were fungi. The disease name of the medicinal plant is not very significant in traditional or Ayurvedic medicine. Therefore, five different medicinal plants were classified into two types as healthy and fungi including the plant type which leads to 10-class classification. Total images of dataset 1 are 2000, and dataset 2 are 2269. With the help of the literature review and various experiments, deep learning models were implemented according to the Convolution Neural Network (CNN) architecture and transfer learning separately. CNN models were assessed with and without image pre-processing methods, such as converting RGB colours to grayscale and applying image filters to remove noise. Eleven layers were used to build CNN model for identifying medicinal plants, while 14 layers were used to classify diseases. In transfer learning, MobileNet V2, Inception V3, and VGG 16 models were used to retrain the two datasets of this study. Here, a new block of layers is trained on top of the existing models to classify five classes of dataset 1 and ten classes of dataset 2. Furthermore, a comparison between CNN and transfer learning was carried out with four types of performance measurement matrices. Transfer learning models outperformed CNN models for medicinal plant identification with 99.5% accuracy for MobileNet V2 and their disease classification with 90% accuracy for VGG 16.

Keywords: CNN, Disease Classification, Medicinal Plant Identification, Traditional Medicine, Transfer Learning