IDENTIFICATION AND CLASSIFICATION OF BRINJAL LEAF DISEASES USING DEEP LEARNING

Tharsini Amirthalingam [1]

[1] Department of Physical Science, Faculty of Applied Science, University of Vavuniya, Sri Lanka.
* Corresponding author email: amirtharsi1997@gmail.com

Abstract: Predominantly being an agricultural nation Sri Lanka relies heavily on cultivation of cereal and vegetable crops with approximately 40% of country's population engaged in agriculture. In Sri Lanka, specifically in Jaffna district "purple" Brinjal is being cultivated as a major vegetable crop, as it thrives well with environmental conditions of Sri Lanka. Moreover, cultivation of Brinjal results in greater financial return and it serves as an integral part of Sri Lankan cuisine. Brinjal crop is susceptible to various leaf diseases, including, Bacterial wilt (*Pseudomonas solanacearum*), *Cercospora* leaf spot (*Cercospora solani me-langenae*), Tobacco mosaic virus (TMV), and Collar rot (*Sclerotium molfsii*), which can consequently affect the yield. Thus, frequent surveillance of leaf condition is essential to overcome the economic losses by leaf diseases. To address this challenge, this research focuses on the Automated Detection and Classification of Brinjal leaf diseases using deep learning approach. We collected a dataset of 435 samples from Jaffna farms, comprise of four different types of diseased leaves and healthy leaves. In detail, our dataset contains 93 samples of Bacterial wilt, 45 samples of *Cercospora* leaf spot, 149 samples of TMV, 65 samples of Collar rot, and 83 healthy leaf samples. We employed a 5-fold cross-validation technique to train four models, among which the VGG16 model demonstrated the best performance. The VGG16 model achieved remarkable results with an average precision of 87.78%, an average recall of 92.07%, an average F1-score of 87.37% and an average accuracy of 85.05%. Results of this study represents a significant advancement in the field of leaf disease detection and holds promise for improving the productivity and profitability of Brinjal cultivation in Sri Lanka.

Keywords: Bacterial wilt, *Cercospora* leaf spot, Collar rot, Five-fold cross-validation, Tobacco mosaic virus, VGG16