

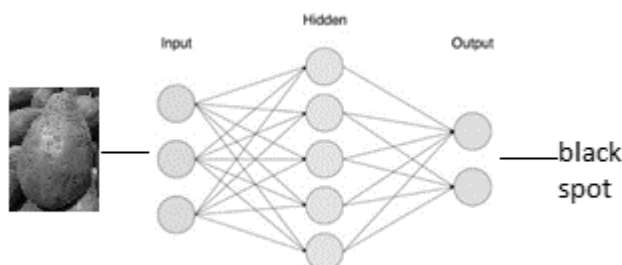
Identification of Papaya Fruit Diseases using Deep Learning Approach

L.V. Munasingha, H. N. Gunasinghe,¹ W. W. G. D. S. Dhanapala

Department of Computing and Information Systems, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka

The diseases are a major problem faced by all the farmers including fruit farmers. It is a threat for large farmlands because these diseases spread throughout the land and make the fruits inedible, which at the end impact badly on the farmer's income. Hence early disease detection is very important for the farmers to prevent or to control the propagation of the diseases. The traditional method of fruit disease detection and identification is naked eye observation. Even if this method is sufficient for a home gardener, it is a very inefficient one that requires experience and expertise. As a solution for this problem several computerized approaches are being developed using Machine Learning and Image Processing techniques in the recent researches. In our proposed work, we considered Papaya fruit, as it is a very popular fruit cultivation in Sri Lanka. In this study we have implemented a computerized model for papaya disease identification using Convolutional Neural Network (CNN). Among various diseases of papaya fruit, anthracnose, black spot, powdery mildew, phytophthora and ringspot were chosen. These are commonly found in Sri Lankan papaya cultivation. We have collected diseased images using a digital camera in normal conditions from papaya farms. Some of the images were found from the publicly available images on the internet. Then we have trained a deep CNN for these images. The network is able to classify images into five major papaya diseases. The system can finally identify the disease once a new image fed to it. The model performed ~92% of classification accuracy for new images. With compared to previous research done using Support Vector Machine (SVM), there is an increase of ~2%. Furthermore, it could be seen that the Black Spot disease was identified very easily by the model. Powdery Mildew was the most difficult disease to recognize. The results of this study reveal that this method is an accurate, reliable and efficient where it could be useful as an aid for expertise.

Keywords: Machine Learning; Convolutional Neural Network; Fruit Diseases



¹ Corresponding author. Tel.: +94-71-125-7092

E-mail address: hansi@appsc.sab.ac.lk