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Anthurium disease detector using machine learning techniques

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There are many problems with planting Anthurium due to diseases. The lack of knowledge about the diseases and identification of the disease correctly, are the major challenges that face by the farmers. Further, some of diseases have no cure, yet must be destroyed before they can be spread. The ways and means of obtaining the essential assistance, for example may be from responsible parties such as Department of Floriculture or Agriculture in Sri Lanka, are limited due to the fact that there is no flexible mechanism to approach their resource personals in efficient manner. Thus, treatment of ill plans becomes hard problem. To overcome these practical difficulties faced by farmers, this study focus to build a mobile application using Android Studio Software to detect the disease through image processing and computer aided models, and thereby, allows farmers to apply disease treatment steps as soon as possible. Using the mobile application, farmers allows to take pictures of disease plant parts, and send for disease detection programs. These programs analyses the images using appropriate machine learning techniques and gives a feedback concerning the disease the plant has. Indeed, correct identification of the plant disease leads to early treatment, and hence the better curing possibilities. The system allows to determine diseases using the images of the Anthurium leaves, flower body, flower nose and the roots of the plants. The system allows to recognize three diseases namely, Bacteria Blight, Rhizoctonia Root Rot and Black Nose Disease. To determine disease correctly, images from all the above mention plant parts are needed. As the disease detection techniques, algorithms using the Convolutional Neural Network (CNN) have been utilized. In particularly, a sequential CNN model namely, LeNet, have been trained and tested using 2962 images. Further, all the images are transformed to gray-scale images to improve the classification rate of CNN algorithms. The models are trained with 10,15,20,30,40,50,75,80 and 100 epochs, and the scenario with 80 epochs performed best in terms of both accuracy and loss values and had the best curve. Based on the image set that has been used, Bacteria Blight, Rhizoctonia Root Rot and Black Nose Disease have been detected with the accuracy of 96.5%, 99% and 98%, respectively. The predicted time is on average less than one second using average computer power utilized in the back end of the system. This accuracy is sufficient for successfully detecting the plant diseases, and thereby, the system that has been engineered will be beneficial for the farmers to manage healthy plant nursery.

Keywords: Anthurium Diseases, CNN, Image Classification, Image Processing, Mobile Application

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