DESIGN AND DEVELOPMENT OF AROID PLANT DEFECT CLASSIFIER USING CONVOLUTIONAL NEURAL NETWORK

Design Project

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Undergraduate Design Project
Submitted to the Faculty of the
College of Engineering and Information Technology
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In partial fulfillment
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ABSTRACT

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The general objective of the study was to design and develop an Aroid Plant Defect Classifier using Convolutional Neural Network. It was intended to be portable and rechargeable. It was targeted to be capable of classifying defects of a Black Velvet "*Alocasia reginula*" plant based on its leaves to avoid severe damage due to improper watering.

The design project was composed of Raspberry Pi 3B+ which handled all the processes the device had to execute. This microcomputer was used to interface other components of the device such as the Camera, Battery, and Touchscreen Display. The back-end system of this device was a trained Convolutional Neural Network Model with an Accuracy of 89.50% while the front-end system was a Graphical User Interface displayed on the Touchscreen display when it turned ON.

The project was tested by the researchers at a farm in Dasmariñas, Cavite, where the device had accuracy values of 90.48%, 87.62%, and 91.43%, and precision values of 87.88%, 78.75%, and 88.24% in classifying Normal, Underwatered, and Overwatered leaves, respectively, using a confusion matrix. The evaluation was conducted at the Engineering Science Building, Cavite State University, Indang, Cavite with the Electronics Engineer Professors.

Based on the results of the evaluation, the design project succeeded in achieving its objectives. The overall performance was considered satisfactory. The cost of the construction of the system amounted to P11,176.00.

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An undergraduate design project submitted to the faculty of the Department of Computer and Electronics Engineering, College of Engineering and Information Technology, Cavite State University, Indang, Cavite in partial fulfillment of the requirements for the degree of Bachelor of Science in Electronics Engineering with Contribution No. 2021-2022 SUMMER-11. Prepared under the supervision of Dr. Edwin R. Arboleda

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INTRODUCTION

There has been a growing trend of collecting houseplants and ornamental plants in the past years. In 2020, the number of people collecting has increased due to the comfort they find in plants. The pandemic, Novel Coronavirus is also a cause of increased growth of plant collectors (Endale, 2020). Taking care of plants became a popular hobby for ages 18-34. The plants became the source of peace, and fulfillment, and can help in lessening the stress and enlightening the mood of the collector. Also, there is a growing community on social media platforms for plant collectors which provides a sense of belonging especially during times of pandemic (Davies, 2020).

Numerous common houseplants are from the family Araceae, commonly known as Aroids, a family of flowering plants that are commonly seen in tropical regions. Many indoor plants are from this family because of their colorful leaves (Encyclopedia.com, n.d.) Although they can survive with low light, aroid plants prefer dappled sunlight. Aroid plants are known to have the same preferences when it comes to nutrients, light exposure, and water quantity (The Sill, 2018).

In Cavite, ornamental, cut flowers, and houseplants are mostly grown in the municipalities of Silang, Trece Martires, and General Emilio Aguinaldo. A total of 10.30