

ABSTRACT

This study aims to develop an application for estimating the quantity of vegetables, specifically lettuce, in a hydroponic system based on object detection using YOLOv5. This application is designed to simplify the process of monitoring the number of plants by utilizing images captured by a camera or frames from a video. The data used consists of directly captured images and images extracted from videos, which were annotated using Roboflow and trained using the YOLOv5 model on Google Colab. The detection results provide the number of lettuce plants based on the identified bounding boxes in the images. Based on testing conducted on 42 valid images, the system showed an average error of 47.28% lettuce out of a total of 4,945 lettuce, with an average accuracy rate of 52.7%. In the noise image test, the accuracy was 25.96%, while in the video frame image test, it reached 80.39% with an error rate of 14.58%. This application is expected to assist farmers or hydroponic system managers in monitoring plant growth more efficiently.

Keywords: *object detection, YOLOv5, hydroponic, lettuce quantity estimation, image annotation*