Individual Lab Report

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Team Name:	Team E Wholesome Robotics
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ILR Number:	06

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1 individual progress overview

There were one primary focus area in the past 2 weeks, which is switching metric from area ratio to discrete severity level in evaluating Mask-RCNN's performance

1.1 Create binary labels to simplify the task

1.1.1 Motivation

(1) From the previous experience, it seems that trinary classification is unlikely to meet the desired goal of 80% precision and recall. Using binary classification will further simplify the problem. (2) From a farmers perspective, an early detection is desirable. By the time a plant health has gone to severe, it's probably too late.

1.1.2 Actual Labeling

Given a test image, Dung-Han Lee will assign a '1' or '0' label to the image indicating the detection of hole or fungus.

1.2 Data augmentation

1.2.1 Software augmentation

To increase the amount of training data, a rotation post-processing (Fig 1) is applied to all the training and validation images. With an increment of 30 degree each time, the dataset has been augmented to 12 times of its original size.

1.2.2 Manual augmentation

Aside from the original kale plant labeled last semester, data of another 3 types of plants (Fig 2) are labeled, each having 100 images and 700 labels in total.

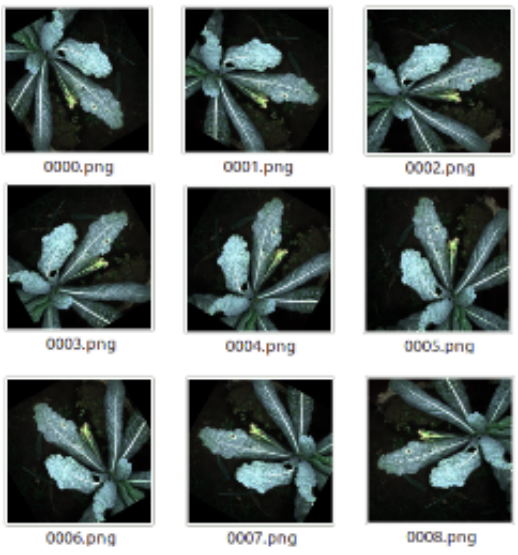

Figure 1: Data augmented with rotation

Figure 2: Three other plants labeled

2 Code clean up

2.1 Motivation

In order to make the software scripts more modular for integration and more readable to other teammates, the original scripts are separated out into standalone, module scripts.

```
The original structure

    training_and_testing_script.py
    + -- all_supporting_functions.py
    + -- post processing files

Modified structure
    train.py
    + -- helper_class.py
    test.py
    + -- helper_class.py
    + -- supporting_functions.py
        /posting_processing
        + -- post processing files
```

3 Challenges

The current approach has seemly reached it's performance upper bound, and highly depends on the perspective, height of the camera, making the system rather not robust to changes in robot/plant growth. Also, the GPU sever I was using in MRSD lab has been moved out without notice, which blocked my working progress since Tuesday.

3.1 Future works

The performance tests will be run on four types of plants to evaluate how well the model can achieved given the extra data. Also potentially a new binary classification network can be deployed to do end-to-end training as we have a much simplier problem now.

4 Teamwork

John: code review of Dung-Han Lee's code. Create achitecture of RTK node for ROS.
Aaditya: Create pipeline for integrated visualization pipeline, pull time stamps GPS data from ROS bag.
Aman: clean up controller code from last sememster.
Hillel: write code for interactive GUI to visualize monitor result.
are working on in field navigation and localisation with Lidar, ZED and RTK GPS. All group members have visited Phipps for a simple field test. (Fig 3)Hillel has been working assembling the electronic subsystem for the platform.