

Holland Computing Center – Plant Phenotyping

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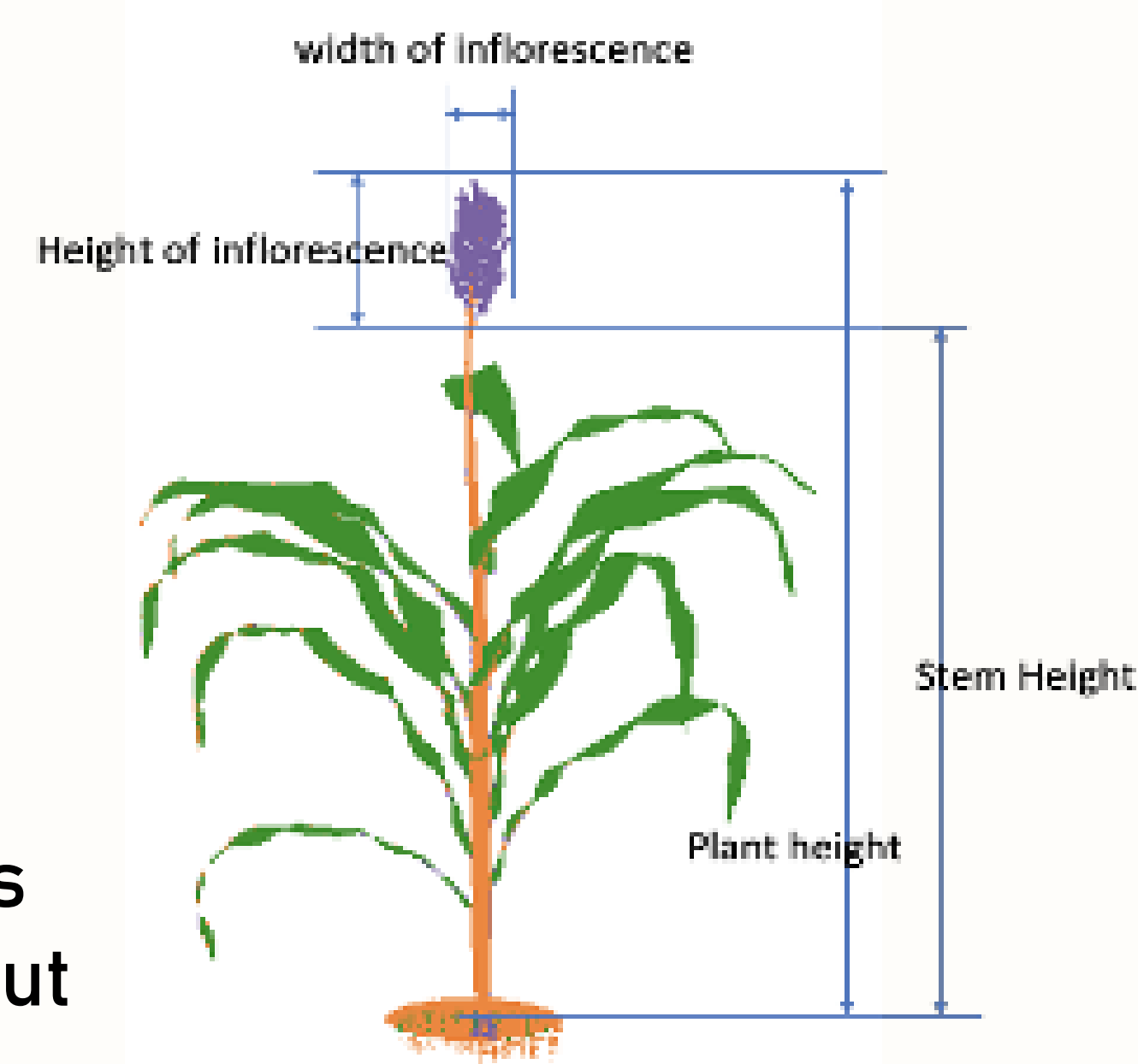


Introduction

Three distinct features of sorghum are predicted from a 3-dimensional array of hyperspectral images using the methods provided by the Schnable Lab.

- Inflorescence - Purple
- Stem - Orange
- Leaves - Green

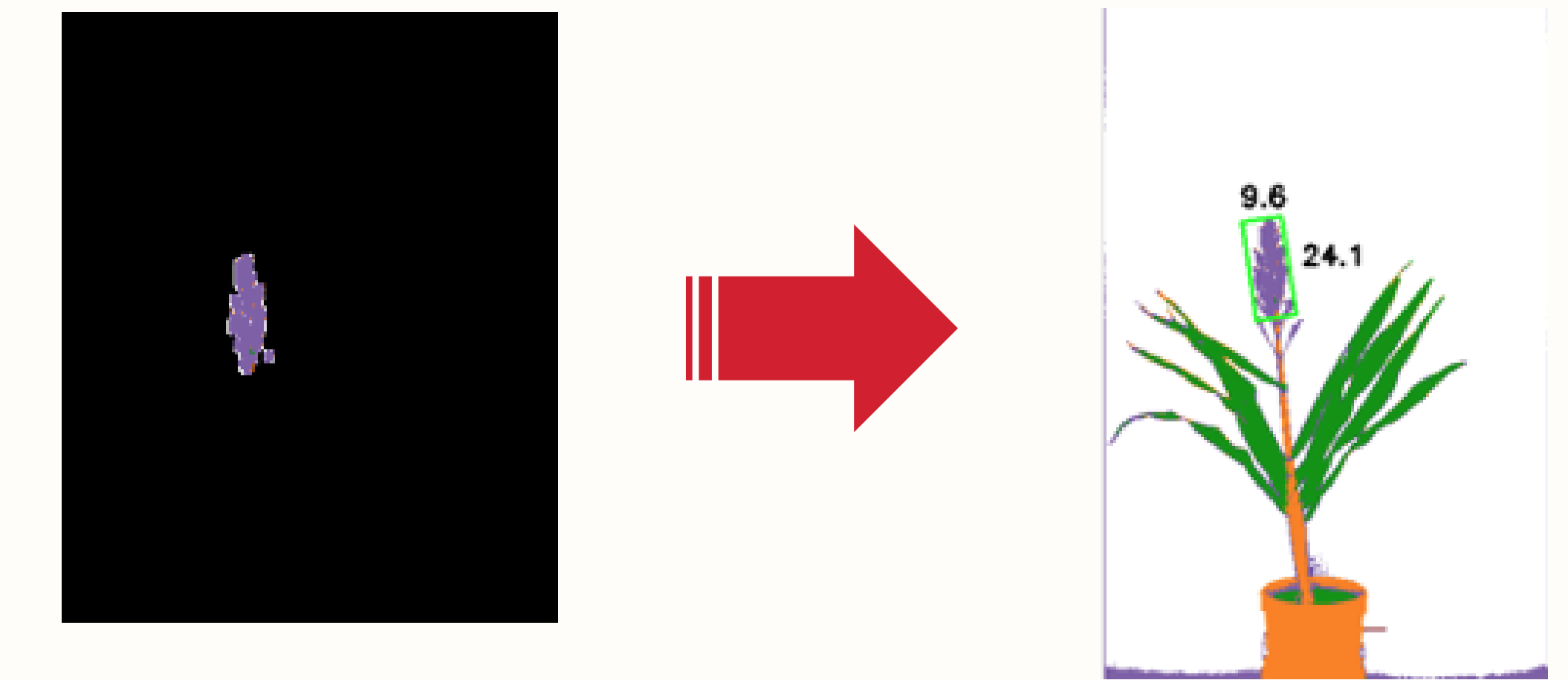
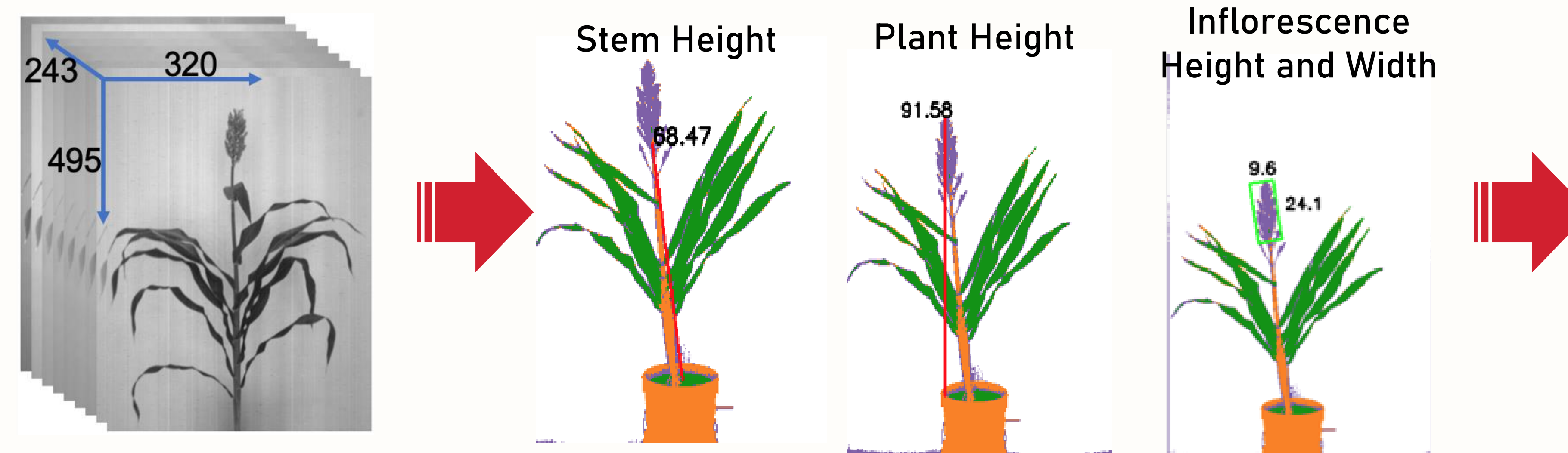
Understanding these features and their growth helps the Schnable Lab track their nutritional needs and provides insight to their genetics without added testing.



Results

The isolated features of the sorghum are interpreted using OpenCV image processing. To get the sorghum dimension their predicted RGB values are isolated, the noise of improper predictions is reduced, and a mask of the desired area is created. Then an aspect ratio for the pixels to centimeters is calculated on the results to get the real world measurements.

This process is created for each of the organ segments. Their data is collected and stored inside a CSV file for each plant id alongside the date it was collected. These CSV files can then be used to later graph the growth trends



Workflow

To improve the computationally expensive task of running these functions on these large datasets, two Pegasus workflows were created. One to compress the datasets and another to extract and process them. The below illustrates steps of the extraction workflow. This workflow implements the GreenhouseEI tools that were developed to add the compression features to the existing Schnable Lab functionality. Clustering was also integrated to the workflow to ease the load on the HCC servers by consolidating short jobs with others into larger jobs.

