

Hue-assisted Convolutional Neural Network (CNN) for plant stem segmentation

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Abstract

In organic farming practices, mechanical weeds control methods such as inter-row cultivating can only achieve about 50% effectiveness. Intra-row weed control, is even harder to achieve satisfaction with current implements (Forcella, 2000). There have been research efforts (Esmael Hamuda, 2016) on segmentation of different parts of a plant, using color information, often combined with machine learning techniques, to achieve a relative higher rate of precision in segmentation. The goal of this research is to investigate a technique that is feasible for real-time applications to locate plant stems for intra-row weed control.

In this paper, a YOLOv2 (Redmon & Farhadi, 2016) based CNN with hue-enhanced pre-processing was chosen for plant stem segmentation. The dataset, containing 344 images of corn seedlings of less than one foot tall, was first annotated and then trained for 1000 epochs before it converged. Figure 1 below shows some sample segmentation output:



Figure 1: Sample segmentation output. The image on the left is the prediction using the original image. The image on the right is the prediction using the enhanced image based on hue values.

Bibliography

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