

**PA-45**

## **Automatic Estimation of Tillers and Leaf Numbers in Rice Using Deep Learning for Object Detection**

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### **[Abstract]**

Recently, many studies on big data based smart farming have been conducted. Research to quantify morphological characteristics using image data from various crops in smart farming is underway. Rice is one of the most important food crops in the world. Much research has been done to predict and model rice crop yield production. The number of productive tillers per plant is one of the important agronomic traits associated with the grain yield of rice crop. However, modeling the basic growth characteristics of rice requires accurate data measurements. The existing method of measurement by humans is not only labor intensive but also prone to human error. Therefore, conversion to digital data is necessary to obtain accurate and phenotyping quickly. In this study, we present an image-based method to predict leaf number and evaluate tiller number of individual rice crop using YOLOv5 deep learning network. We performed using various network of the YOLOv5 model and compared them to determine higher prediction accuracy. We also performed data augmentation, a method we use to complement small datasets. Based on the number of leaves and tiller actually measured in rice crop, the number of leaves predicted by the model from the image data and the existing regression equation were used to evaluate the number of tillers using the image data.

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