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A Practical Study on Banana (Musa spp.) Plant Counting and Coverage Percentage Using Remote Sensing and Deep Learning

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Abstract

This paper focuses on a practical study to count banana plants and evaluate their coverage in RGB images. Two approaches were used: GLI and K-means algorithms and the YOLOv5m model. The GLI and K-means combination demonstrated the ability to identify the center of the banana plant. The YOLOv5m deep learning approach showed solid performance, evidenced by a significant 86% precision and 90% recall during training. Overall, the methods showed favorable results in the evaluation, with an IoU of 81% for GLI and K-means and 76% for the YOLOv5m application. Regarding coverage estimation, the U-Net architecture achieved an IoU of 52.3% in the testing data. However, the model sought to adapt to the morphology of banana plants. This study contributes to the informed selection of techniques for agricultural monitoring and analysis of crops such as banana.

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