Research on Maize Leaf Counting Based on Target Detection

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Abstract

This paper proposes an enhanced YOLOv5n model, named CTR\_YOLOv5n, that incorporates a Coordinate Attention (CA) mechanism and a Swin Transformer (STR) detection head to identify common maize diseases, such as leaf spot, gray spot, and rust, in mobile applications. Maize diseases are known to occur frequently and are complicated and difficult to control, which can have a significant impact on maize yield and quality. By building upon the lightweight YOLOv5n model, the accuracy of the CTR\_YOLOv5n model is improved through the addition of a CA attention module, which enhances the model's global information acquisition capabilities by using TR2 as the detection head. The algorithm model achieves an average recognition accuracy of 95.2%, which is 2.8% higher than the original model, and the memory size is significantly reduced to 5.1MB compared to 92.9MB of YOLOv5l, which meets the requirement of being lightweight. Compared with mainstream attention mechanisms like SE, CBAM, and ECA, the CA mechanism used in this model provides better recognition results and higher accuracy, enabling fast and accurate recognition of maize leaf diseases with fewer computational resources. These findings provide new insights and methods for real-time recognition of maize and other crop spots in mobile applications.

Keywords: Maize-Leaf Anomaly; Object Detection; Deep-Learning ; Digital Agriculture

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