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Integrating Artificial Intelligence Methods for Precision Agriculture Applications Based on Remote Sensing Images

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Analyzing a significant amount of remote sensing data obtained through Unmanned Aerial Vehicles (UAVs) and satellite-based technologies for Precision Agriculture (PA) applications involves artificial intelligence (AI) methods. AI applications aim to enhance crop yield efficiently while minimizing input costs and environmental impacts in optimal locations. Designing the most suitable deep learning architecture, considering the requirements of PA, is crucial. This architecture should maximize the utilization of multispectral band images found in remote sensing data, offering significant information. However, specific AI techniques, particularly Convolutional Neural Networks (CNNs), experience delays in inference. There is limited research on AI algorithms that integrate into UAVs for real-time PA applications. Therefore, the designed CNN architecture should aim to reduce inference time and establish a balance between speed, memory, and accuracy. This study evaluates the performance of various CNN architectures, considering all PA application requirements for detecting objects such as trees, crops, and wheat yellow-rust disease. The final discussion covers modifications relevant to achieving an optimal CNN architectural design for PA.

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