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Plant Disease Recognition Using Transfer Learning: A Comparative Study of CNN Models

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Plant disease detection and classification are critical for ensuring sustainable agriculture and food security. In recent years, convolutional neural networks (CNNs) have emerged as state-of-the-art solutions for image classification tasks due to their remarkable performance in extracting meaningful features from complex datasets. This study evaluates the performance of state-of-the-art CNN architectures, including VGG16, ResNet50, and MobileNetV2, on a publicly available plant disease dataset. The dataset consists of high-resolution images of leaves affected by various diseases, as well as healthy samples, providing a robust testbed for assessing model performance. Each model demonstrated reliable classification results, with VGG16 performing slightly better in balancing accuracy and computational efficiency. However, all models struggled with subtle disease patterns, highlighting the need for further optimization or integration with advanced preprocessing techniques.

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