ViT-AlexNet: A Hybrid Approach for Chili Leaf Disease Classification

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Abstract:

Chili peppers are widely cultivated for their culinary and economic value, making the detection and classification of plant diseases critical for optimal yield. This study focuses on the classification of leaf diseases in chili pepper plants using a dataset containing images categorized into five groups: Cercospora leaf spot, powdery mildew, Murda complex syndrome, nutritional deficiency, and healthy leaves. To ensure balanced data distribution, augmentation techniques were applied to expand the dataset. Initially, the dataset was classified using the AlexNet deep learning model, achieving an accuracy of 86.43%. To improve performance, the model was enhanced by integrating the Vision Transformers (ViT) method, resulting in a hybrid ViT-AlexNet model with a classification accuracy of 94.80%. This study highlights the increasing effectiveness of Vision Transformers for image recognition tasks, particularly in disease classification, and compares their performance against traditional deep learning models. The findings suggest that combining Vision Transformers with conventional architectures can lead to significant accuracy improvements.