Identification and Classification of Diseases in Pomegranates using Deep Learning

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Abstract: Pomegranate diseases, such as bacterial blight and fungal infections, are major threats to agricultural productivity. Since these diseases can greatly affect crop yields and quality, early detection can help preventing significant economic losses for farmers. This study focuses on the identification and classification of these diseases using a deep learning approach, specifically Convolutional Neural Networks (CNNs) as it is effective for image classification. A dataset contains 759 images with 276 showing fungal disease and 226 healthy fruits collected locally, and 257 bacterial blight images sourced from the Kaggle dataset. The images were divided into 80% for training and 20% for testing. Fine-tuned models such as VGG16, VGG19, and MobileNet were applied for multi-class classification of pomegranate fruits into three categories: healthy, fungal, and bacterial blight. The MobileNet model outperformed the others, achieving an accuracy of 97%, while VGG16 and VGG19 attained 94% and 87%, respectively. The models were evaluated using performance metrics like accuracy, precision, recall, and F1 score. The results demonstrated that CNN-based models are highly efficient in classifying pomegranate diseases, offering methodologies that improve predictive analysis. This research provides an accurate and effective solution to classify pomegranate diseases, addressing a critical agricultural challenge with potential economic impacts.

Keywords:Convolutional Neural Networks, Disease detection, Disease classification, Deep learning models, Pomegranate