

Title: MN1 DN121 Vg19: A Multi-stream Ensemble Model for Detecting External Damage on Tomato Surface

Author: Most. Jebun Nahar Juthy; Tauhid; Md. Faruk Hosen; Md. Abul Basara; Mst. Nargis Aktar; Muhammad Shahin Uddin

Abstract: The use of advanced computer vision and powerful deep-learning capabilities is increasingly important in the agricultural industry, particularly for monitoring crops and detecting diseases. However, detecting external damage to fruit crops remains a significant challenge. In our study, we introduced a multi-stream ensemble model called MN1_DN121_Vg19, which is designed to identify external damage on tomato surfaces. We separately used different pre-trained approaches, including InceptionV3, ResNet50, ResNet101, VGG16, VGG19, MobileNetV1, and DenseNet121, and we examined how well they performed. After evaluating their performance, we merged the three wellknown pre-trained methods: MobileNetV1, DenseNet121, and VGG19, and extracted the learned features from these models. After that, we fine-tuned some of the top layers to effectively learn the features from our used dataset. The top 10 layers of DenseNet121 and MobileNet, as well as the top 4 layers of VGG19, were fine-tuned to create the merged model. The accuracy of the suggested multi-stream ensemble model was 98.51% using a dataset of 6500 images across 4 classes. When compared to existing pre-trained models, our merged model demonstrated superior performance across all metrics.

Keywords: Deep Learning , Computer Vision , Defect detection , Agriculture , Image processing

DOI: <https://doi.org/10.1109/ICECE64886.2024.11025031>

<https://ieeexplore.ieee.org/document/11025031>