

COFFEE LEAF DISEASE DETECTION USING SQUEEZE- AND-EXCITATION NETWORK WITH ATTENTION MECHANISM

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ABSTRACT

Coffee leaf disease detection presents a significant challenge in coffee cultivation due to the visual similarity among various disease symptoms, which often complicates manual identification. While several previous studies have utilized conventional Convolutional Neural Networks (CNNs) for disease classification, their ability to distinguish complex texture variations remains limited. This study proposes an enhanced Squeeze-and-Excitation Network (SENet) integrated with an attention mechanism to improve detection performance. The model was trained on 3,177 coffee leaf images sourced from three public datasets—Coffee Leaf Diseases, Disease and Pests in Coffee Leaves, and RoCoLe.Original—and evaluated on 636 separate test images. Experimental results showed a training accuracy of 96%, testing accuracy of 94%, with an average F1-score of 0.95, precision of 0.94, and recall of 0.95, outperforming architectures such as InceptionV3, MobileNet, and ResNet101V2. The model was deployed into a real-time Android application, enabling farmers to capture coffee leaf images, upload them, and receive instant diagnostic feedback and treatment recommendations. The system also features local storage for detection history. These findings demonstrate that the SENet-attention approach provides a reliable and practical solution for assisting farmers in early disease identification, reducing unnecessary pesticide use, and supporting smart and sustainable agriculture practices.

Keywords: *Android, Attention Mechanism, Coffee Leaf Disease, Deep Learning, Squeeze-and-Excitation Network.*