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Drone-Based Diseased Plant Detection Using RetinaNet and Transfer Learning

Sunitha Guruprasad
Associate Professor, Department of CSE
St Joseph Engineering College, Mangaluru, India

Abstract: *Machine learning and deep learning have significantly transformed various domains, including medicine, engineering, and agriculture. In this work, we propose a novel deep learning-based approach for detecting stressed potato plants using drone-captured images. Early detection of crop stress, particularly due to insufficient water, is critical as stressed potato plants exhibit symptoms such as leaf yellowing, which can be difficult and time-consuming to monitor manually in large-scale fields. A RetinaNet architecture, a single-stage object detector developed by Facebook, to identify and classify stressed potato crops is employed in the work. The model was trained on an augmented dataset of 1,400 drone images of potato fields using TensorFlow and Keras. Experimental results demonstrate that the trained model effectively detects and classifies stressed plants, offering a reliable alternative to manual field inspection. The proposed system has the potential to save farmers substantial time and labour, thereby enhancing productivity and resource management. Future work will focus on extending the model to multiple crops and disease types, improving accuracy, and exploring faster detection architectures for real-time applications.*

Keywords: Deep learning, RetinaNet, Drone imaging, Precision agriculture, Crop stress detection, Potato plants, Image classification

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