OPTIMA

Redefining Pest Management - a Holistic Approach

Practice Abstract Nº 17

Description of OPTIMA EDS and results

OPTIMA EDS is a fully functional smart camera-based disease detection system. Although significant advances have been made in the field of image-based plant disease detection, it must be acknowledged that in studies found in literature the disease detection was performed on fixed-size datasets with limited variation, making them only partially relevant for a real-world field application. Within OPTIMA an integrated Early Detection System (EDS) that can be used in commercial orchards, vineyards and open fields is developed. Deep learning based disease detection using color RGB cameras for the detection of apple scab in orchards, downy mildew in vineyards and Alternaria in carrot fields are applied. The system consists of a smart camera, image processing pipeline, localization through a global navigation satellite system (GNSS) system and wireless connection to a decision support system (DSS). The system can be operated while mounted on a platform that drives through the orchard, vineyard, or field with a speed of 1.5 km/h. Final system performance was a detection score (F1) of 66% for downy mildew in grapes, 45% for scab in apple and 42% for Alternaria in carrot. These scores are on spot level, when translated to spraying resolution the measurements are higher. False color images extracted from multispectral data clearly identify the disease spots in carrot and apple. Nevertheless a multispectral based deep learning classifier does not outperform the RGB based classifier, presumably due to the fact RGB based pre-trained networks were used.

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