

Deep Learning-Based Segmentation for Plant Leaf Disease Identification



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Recent increase in plant diseases is threatening global food security and economy, with causes including climate change, misuse of chemicals, and pollution. To tackle this issue, modern image-based recognition systems using deep learning have been proposed. However, challenges remain, such as the diversity of leaf diseases/species and difficulties in collecting/annotating real-world datasets. In this study, we advocate for a context-aware approach that targets the detection of local disease symptoms. This strategy aims to mitigate biases associated with context and background, particularly evident in the widely utilized PlantVillage dataset, ultimately leading to the development of a more generalized disease classification model. To achieve this, our approach is two-fold: Firstly, we integrate semantic segmentation into the plant disease identification process. Secondly, we emphasize the independent identification of diseases, regardless of the species involved, thereby facilitating the recognition of disease in new species not previously encountered. To this end, we conducted extensive experiments, including a comparison of different semantic segmentation and classification CNNs, on the PlantVillage dataset (composed of leaves within a homogeneous background). This allowed us to assess the effectiveness of using local disease symptom features for disease identification. Notably, we demonstrated a significant improvement in disease identification accuracy, particularly in the IPM and BING datasets (which hold leaves within an uncontrolled background).

Biography:

Olfa Mzoughi received her Ph.D. degree in Computer Science (Signal & Image) from Telecom ParisTech, France. She also holds engineering and M.Sc. degrees in Telecommunications from the High School of Communications of Tunisia (SUPCOM). Currently serving as an Assistant Professor in the Department of Computer Science at the College of Computer Engineering and Sciences, Prince Sattam bin Abdulaziz University, her research interests span various areas including Computer Vision, Image Classification, Image Processing, Image Segmentation, Machine Learning, and Deep Learning. Her research findings have been featured in numerous peer-reviewed publications.