DETECTION OF FOLIAR DISEASES IN STRAWBERRY PLANTS USING IMAGE PROCESSING

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Abstract. *This work explores the development of an image processing system focused on identifying foliar diseases on strawberry plants, particularly the detection of red spots characteristic of leaf scorch. Through color segmentation in the HSV color space, Otsu thresholding, and morphological operations, this system isolates and quantifies the affected regions in static images in an efficient way.*

Keywords: *image processing, hsv, thresholding, foliar diseases, opencv, python.*

Foliar diseases significantly affect agricultural production; in strawberry plants, leaf scorch is a common disease characterized by reddish spots on the leaves, and its early detection plays an essential role to prevent yield losses. However, traditional methods rely on human inspection, which may lead to misdiagnosis and limit their applicability in intensive production environments.

This work proposes an automated system that uses OpenCV to detect and quantify affected areas in strawberry leaves from static images (Figure 1). The method applies Otsu thresholding on the saturation channel to isolate the leaf from the background efficiently and uses the HSV color space to differentiate healthy tissue (green tones) from diseased regions (red tones). This approach reduces computational cost compared to more complex alternatives such as deep learning.

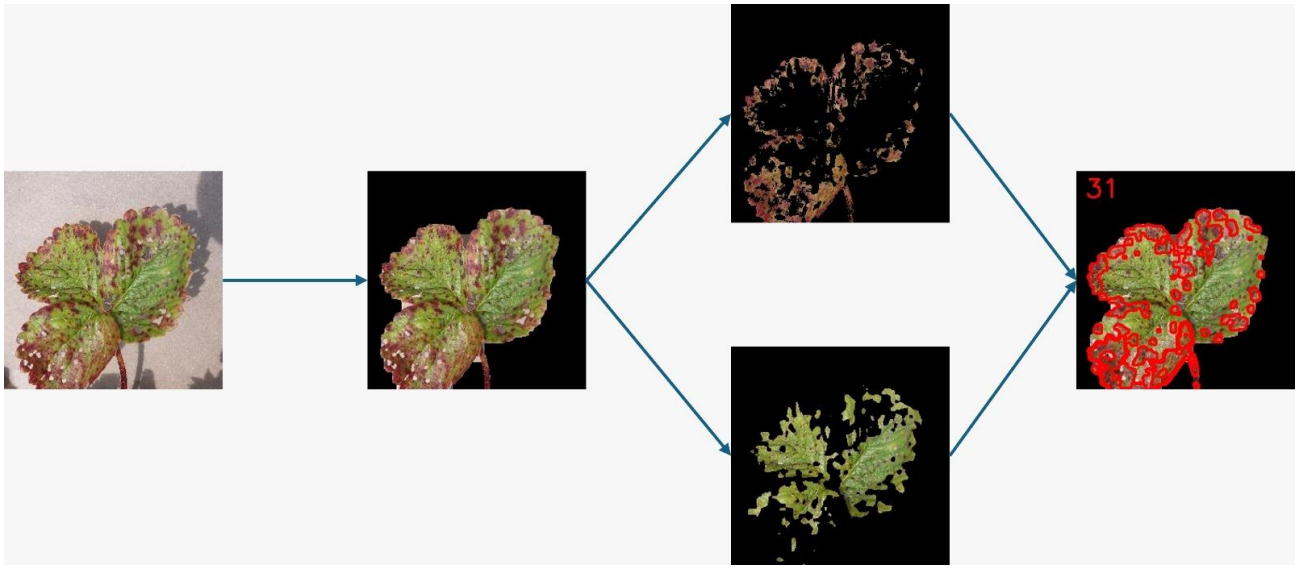

Figure 1 – Diagram of the processing pipeline applied to each image:
background removal, color segmentation, and contour extraction

The system was developed in a modular manner, including background removal using Otsu thresholding, green color segmentation using filtering and morphological operations, detection of red regions based on HSV ranges and contour analysis, and segmentation refinement using connected components to preserve the main leaf. Additionally, batch processing of the Mendeley Data dataset was implemented to evaluate the system's performance on a larger set of images (Figure 2).

The results show effective and robust segmentation with low computational cost. As future work, it is proposed to estimate the disease severity based on the percentage of affected area and to explore the use of neural networks to improve the system's accuracy.

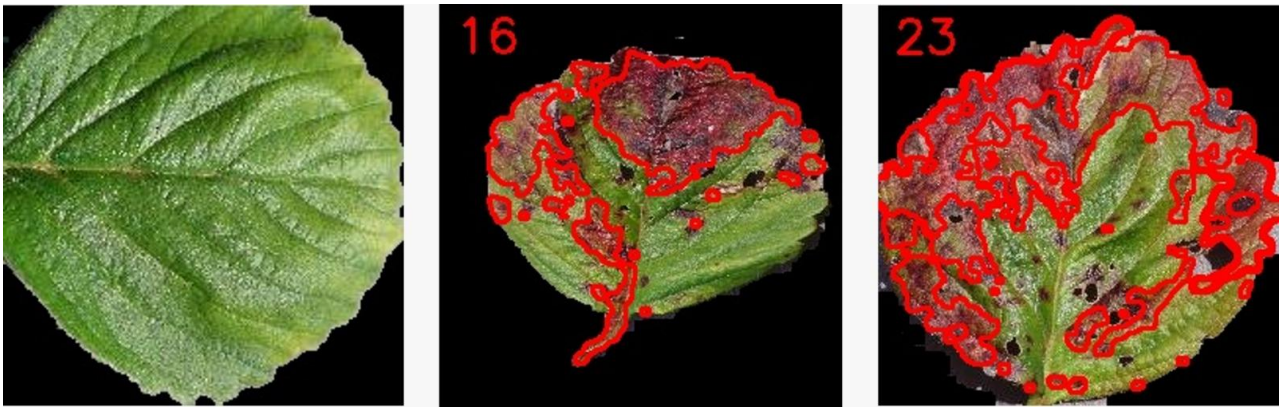

Figure 2 – Results of the system applied to images from the Mendeley Data dataset. The rightmost image shows a healthy leaf, while the middle and leftmost images show leaves with advanced infection

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