HLB Disease Detection in Omani Lime Trees using Hyperspectral Imaging Based Techniques

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Abstract : In the recent years, Omani acid lime cultivation and production has been affected by Citrus greening or Huanglongbing (HLB) disease. HLB disease is one of the most destructive diseases for citrus, with no remedies or countermeasures to stop the disease. Currently used Polymerase chain reaction (PCR) and enzyme-linked immunosorbent assay (ELISA) HLB detection tests require lengthy and labor-intensive laboratory procedures. Furthermore, the equipment and staff needed to carry out the laboratory procedures are frequently specialized hence making them a less optimal solution for the detection of the disease. The current research uses hyperspectral imaging technology for automatic detection of citrus trees with HLB disease. Omani citrus tree leaf images were captured through portable Specim IQ hyperspectral camera. The research considered healthy, nutrition deficient, and HLB infected leaf samples based on the Polymerase chain reaction (PCR) test. The highresolution image samples were sliced to into sub cubes. The sub cubes were further processed to obtain RGB images with spatial features. Similarly, RGB spectral slices were obtained through a moving window on the wavelength. The resized spectral-Spatial RGB images were given to Convolution Neural Networks for deep features extraction. The current research was able to classify a given sample to the appropriate class with 92.86% accuracy indicating the effectiveness of the proposed techniques. The significant bands with a difference in three types of leaves are found to be 560nm, 678nm, 726 nm and 750nm.

 $\textbf{Keywords:} huanglongbing (HLB), hyperspectral imaging (HSI), \cdot omani citrus, CNN$

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