Multivariate Analysis of Spectroscopic Data for Agriculture Applications

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Abstract : In this study, a multivariate analysis of potato spectroscopic data was presented to detect the presence of brown rot disease or not. Near-Infrared (NIR) spectroscopy (1,350-2,500 nm) combined with multivariate analysis was used as a rapid, non-destructive technique for the detection of brown rot disease in potatoes. Spectral measurements were performed in 565 samples, which were chosen randomly at the infection place in the potato slice. In this study, 254 infected and 311 uninfected (brown rot-free) samples were analyzed using different advanced statistical analysis techniques. The discrimination performance of different multivariate analysis techniques, including classification, pre-processing, and dimension reduction, were compared. Applying a random forest algorithm classifier with different pre-processing techniques to raw spectra had the best performance as the total classification accuracy of 98.7% was achieved in discriminating infected potatoes from control.