

Discrimination of common defects in loquat fruit cv. 'Algerie' using hyperspectral imaging and machine learning techniques

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Abstract

Loquat (*Eriobotrya japonica* L.) is an important fruit for the economy of some regions of Spain that is very susceptible to mechanical damage and physiological disorders. These problems depreciate its value and prevent it from being exported. Visible (VIS) and near infrared (NIR) hyperspectral imaging was used to discriminate between external and internal common defects of loquat cv. 'Algerie'. Two classifiers, random forest (RF) and extreme gradient boost (XGBoost), and different spectral pre-processing techniques were evaluated in terms of their capacity to distinguish between sound and defective features according to three approaches. In the first approach the fruit pixels were classified into two classes, sound or defect, with a 97.5% rate of success; in the second the defective features were considered internal or external defects, achieving a 96.7% rate of success; and in the third approach each type of defect, i.e. purple spot, bruising, scars and flesh browning, were considered separately with a correct classification rate of 95.9%. The results indicated that the XGBoost classifier was the best method in all cases.