Title An experimental machine vision system for sorting sweet tamarind

Author Bundit Jarimopas and Nitipong Jaisin

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Abstract

The purpose of this research was to develop an efficient machine vision experimental sorting system for sweet tamarind pods based on image processing techniques. Relevant sorting parameters included shape (straight, slightly curved, and curved), size (small, medium, and large), and defects. The variables defining the shape and size of the sweet tamarind pods were shape index and pod length. A pod was said to have defects if it contained cracks.

The experiment involved the use of pods from two sweet tamarind cultivars: "Sitong" and "Srichompoo". The sorting system involved the use of a CCD camera which was adapted to work with a TV card, microcontrollers, sensors, and a microcomputer. Analysis was performed with image processing software. Analysis of variance was computed with regard to the variables of shape, size, and defects, and took into account variations in the control factors of belt speed, pod orientation, and spacing.

The results showed that the three control factors did not significantly affect shape, size, and defects at a significance level of 5%. The averaged shape indexes of the straight, slightly curved, and curved pods were 51.1%, 61.6%, and 75.8%, respectively. Pod length was found to be influenced by size and cultivar, with Sitong and Srichompoo pods ranging from 10.0 to 14.0 cm and 8.5 to 12.4 cm, respectively. The vision sorting system could separate Sitong tamarind pods at an average sorting efficiency (E_w) of 89.8%, with a mean contamination ratio ($\bar{C}_R$) of 10.2% at a capacity of 1517 pod/h. Respective figures for Srichompoo pods were E_w; 94.3%; $\bar{C}_R$, 5.7%; and capacity, 1491 pod/h. The contamination ratios met the export standards mandated by the Thai agricultural commodities and food codification.