Abstract

This paper reports the development and testing of machine vision systems for sorting apples for surface defects, including bruises. The system operated on apples, which were oriented with the stem/calyx axis perpendicular to the imaging camera. Grey-scale images in the visible wavebands were used to verify orientation. Images for detection of defects were acquired through two optical filters at 740 and 950 nm, respectively. Defects were detected using a combination of three different threshold segmentation routines and one routine based on artificial neural networks and principal components. The paper reports quantitative measurement of the performance of the system for verification of orientation and a combination of the four segmentation routines. The routines were evaluated using eight different apple varieties. The ability of the routines to find individual defects and measure the area ranged from 77 to 91% for the number of defects detected, and from 78 to 92·7% of the total defective area.