Papaya fruit grading based on size using image analysis

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Papaya is the largest contributor to fruit export of Malaysia. Before exportation, these fruits for export are graded according to their size, maturity and defects. The major parameter which is used to classify fruit size is their weight. Currently, the papayas are being weight individually and such practice is time consuming and labor-intensive. The advent of computers and machine vision technology offers great potential to automate this process. Therefore, the objective of this research is to estimate the papaya weight using results of the image analysis and then classify them according to their grades. The methodology involves measuring the actual volume and weight of papaya samples, and capturing their images. The characterization results showed that the weight and volume parameters are highly correlated and therefore, the derived formulation based on the collected data could be used to estimate the size of papaya. In the image processing task, the morphological procedures and segmentation using excess green color filter allow papaya images to be precisely distinguished from the background and shadow. This in turn allows the computation of the estimated volume of papaya simply by measuring the radius of the object at specific area and integrating over the length. Finally, papaya weights are estimated using the volume information. The classification ability of the proposed system when tested yields above 90% accuracy.