

Estimation of volume and weight of apple by using 2D contactless computer vision measuring method

Fauzi, Afiq Ikhwan Mohd^a; Bin Ibrahim, Mohd Zamri^b; Bin Saealal, Muhammad Salihin^c

^a College of Engineering, Universiti Malaysia Pahang, Pahang, Pekan, Malaysia

^b Faculty of Electrical and Electronics Engineering Technology, Universiti Malaysia Pahang, Pahang, Pekan, Malaysia

^c Faculty of Electrical and Electronic Engineering Technology, Universiti Teknikal Malaysia Melaka, Melaka, Durian Tunggal, Malaysia

ABSTRACT

Volume and weight are key parameters that have been used as a benchmark to identify the quality of apples. These two parameters can be easily measured individually by using a weighing balance to measure weight and the water displacement method (WDM) to measure volume. However, these two methods are not suitable to apply in industries since both methods require a lot of time to obtain the final output. Therefore, a new approach is needed. The main objective of this work is to develop a contactless system based on computer vision system that can estimate the volume and weight of apples by using the width and height via 2D image captured. The camera needs to calibrate in order to get the ratio of pixel/cm by using the checkerboard point detection technique. Mask regional convolution neural network (R-CNN) was used to detect and segment apple images while providing the height and width of apples. The system was tested with four different settings, with 20cm and 30cm distance, and two different camera models. The best estimation of the volume and weight of apples obtained were with errors of 11.97 % and 11.49 % respectively. Overall, the findings showed that height and width from a 2D calibrated perspective can be used as an alternative method for the contactless assessment of apple volume and weight.

KEYWORDS

2d calibration; Apple segmentation; Mask-RCNN; Volume and weight estimation

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