Title Improving fruit detection for robotic fruit harvesting

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Abstract

One of the challenges of developing a fruit-harvesting robot is fruit detection. Fruit detection in an unstructured environment with variable lighting conditions greatly affecting the robot's harvesting efficiency. This paper presents the enhancement of robotic citrus harvesting by improving fruit recognition and fruit visibility. To detect the fruit, an image processing approach was developed that is robust to outdoor variable illumination and has the ability to detect fruits in cluster and partially occluded fruit. The fruit portion was enhanced by the red chromaticity coefficient and a circle detection method enabled the individual fruits to be classified. To improve fruit visibility, the fruit detection algorithm was combined with a multiple viewing technique that would acquire multiple views of a portion of a tree canopy from different viewing angles. Results showed that by acquiring multiple views, fruit visibility improved from 50% to about 90%. The outcome of this study will be useful for targeting fruits for robotic fruit harvesting.