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On-Tree Detection and Counting of Apple Using Color Thresholding and CHT

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Abstract



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Abstract: One of the challenges in continual fruit cultivation is to approximately calculate the number of fruits on a tree. This helps to get yield estimation for different farm operation. On-tree detection and counting of apple fruits in a correct manner is a challenging task in computer vision. This work implements circular Hough transform (CHT) and colour thresholding in an iterative manner in image processing method to detect and count each apple fruit. The fruit identified by CHT which were clearly visible are preferred for early harvesting than the partially visible fruits. The methodology proposed in this paper has the capability to detect and count fully visible as well as partially visible apple fruit. The precedence of Circular Hough Transform is to detect and count overlapping fruit. The count evaluated by the proposed algorithm results in 97.70% of accuracy.

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I. Introduction

Harvesting is a time-consuming task which requires a huge number of workers at the time of harvest season. India is the second largest producer of apple fruits, share 2.05% to the world. Now a day a significant amount and varieties of apples are implanted in Himalayan range of India: golden delicious, Ambri Kashmir, Red delicious, Maharaji apple, & Hazaratbali apple. Apples are mostly consumed fresh fruit and high-quality commercial cultivated crop. Labour and their wage cost for harvesting apples is a major problem for the apple farmers in the Himalayan range: Himachal Pradesh, Arunachal Pradesh, and Jammu & Kashmir. The solution to labour problem can be overcome by using automatic harvesting system or robots. The automatic system of capability to separate an apple fruit from other parts of the tree. Robust and accurate image processing techniques are required for fruit detection, counting of both fully and partially visible fruits. Apple visual characteristics are mainly divided into two categories –non-occluded and occluded fruits. Occluded fruits consist overlapping fruits and obstruct by branches and leaves.

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