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Perspective

Brief Note on Harvest Quality Vision

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DESCRIPTION

An Ontario software company is helping growers automate more of their harvesting processes using artificial intelligence. The HQV system consists of a tablet that records images of the harvest bins and a cloud-based image processor, providing a fast, cost-effective and objective way to monitor and analyze progress of harvest rate. Thanks to its instant image processing and analysis capabilities, the HQV determines the size, color and number of fruits within its visible range and automatically alerts the producer in case of deviations from imported standards. As a result, growers and field/orchard managers are aware of and can address problems such as quantity shortages, defects and diseases much faster without tedious manual checks or waiting for test report 'packaging. [1]

Many aspects of fruit and vegetable production still require manual labor, so automation has the potential to reduce farm labor costs. For most, that's the biggest part of their production costs. Harvest Quality Vision (HQV) captures images of fruit harvested from crates and uses artificial intelligence to analyze these images to quickly determine fruit size, color and quantity. Alerts are sent to the manufacturer or employee if he detects deviations from an acceptable standard.

This not only eliminates the tedious routine manual inspection of harvested fruit, but also allows growers and field/garden managers to resolve quantity problems, quality defects or problems. Illness before the fruit is packed. According to marketing coordinator Rachael Shaw, the goal is a more consistent harvest, a higher quality product, and less manual labor. HQV is the newest addition to the system, sourced from the Ontario apple industry and growers who want to be able to track crop protection applications in their orchards.

The use of artificial vision and its related algorithms improves the efficiency, functionality, intelligence and remote interoperability of harvesting robots in complex agricultural environments. The machine vision and its accompanying emerging technology promise enormous potential in advanced agricultural applications. However, the machine vision and its precise positioning are still fraught with technical difficulties, which make it difficult for most harvesting robots to achieve real commercial applications. This paper reports on the application and research progress of harvesting robots and visual technology in fruit picking. [2]

Potential applications of vision and quantitative methods for localization, target recognition, 3D reconstruction and fault tolerance of complex agricultural environments are also targeted and fault-tolerant technology is designed. Designed for use with machine vision and robotic systems are also explored. Two main methods used in fruit recognition and localization are considered, including digital image processing technology and deep learning-based algorithms. Future challenges to recognition and localization success rates identified: target recognition under variable lighting and occlusal environmental conditions; turbulent target tracking, 3D target reconstruction and vision system fault tolerance for agricultural robots. Finally, a number of open research problems specific to identification and localization applications for fruit harvesting robots are addressed, and also describe the latest trends in developments and developments in the field of robotics the future of machine vision. [3]

A harvesting robot is designed to automatically pick fruit under certain environmental conditions. Machine vision research based on harvesting robots is a stub. With the development of artificial intelligence technology, 3D spatial information about the target can be acquired and processed. Floating vision technology is a major bottleneck in harvesting robot applications, particularly in crop recognition, location algorithms, error handling, and dynamic tracking of small objects.

The working environment of the fruit harvesting robot's visual parts is complex. Work items are crops, including apples, lychees, citrus, grapes, strawberries, or peppers. These objects vary in size, shape, color, and texture. The background and lighting of the plants are constantly changing. Harvesting robots based on artificial vision should be able to detect and adapt to different crops or changes in the environment, gather information, detect targets, and learn on their own. [4]

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The harvesting robot's intuitive sensor technology is designed to detect crops and fruits. The robotic servo controller collects 3D information about the fruit's surroundings, including 3D geometry and coordinates. The intuitive camera and its control system can serve as supporting hardware for image sensing technology, acting as a communication interface between the external environment and the robot. The images obtained by the camera are generally classified into digital images, laser images and multi-optical images. This section will review image sensing technology as a whole and its components.

Currently, two forms of stereo vision systems are mainly deployed. The first is a binocular vision system based on optical geometry. The 3D position of the target is obtained using traditional optical principles and optimization algorithms. The second is an RGBD camera based on the timeofflight (ToF) method, which uses an infrared sensor to obtain information about the depth of a target. The ToF method is sensitive to external noise and may not work in brightly lit scenes. On the other hand, the depth measurement accuracy of this method is limited by the working distance of the infrared sensor. In contrast, the method based on geometric optics is a passive measurement method that does not rely on artificial light sources and can be used in indoor and outdoor environments.[5]

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