Fruit tracking using RGB-D

Detecting fruits in orchards is of paramount importance in precision agriculture applications. Knowing the number and position of fruits can help in robotic applications or to estimate the yield. This can be used to improve the profitability and sustainability of agricultural production and optimize the use of available resources.

One of the main problems in fruit detection is the occlusions caused by the leaves. Occlusions depend on the point of view, so capturing the images from different perspectives will result in different fruits being visible or occluded.

The goal of this project is to capture a video sequence of the fruit trees using a camera that travels along the row of trees. In this way, each frame of the sequence presents a different perspective of the trees and fruits. Most of the fruits that are occluded in a frame will be visible in another one. To avoid counting each fruit multiple times, the fruits must be given a unique ID. This can be achieved using object tracking. To improve the performance of the tracking, the use of RGB and RGB-D sequences will be studied and compared. The algorithm developed in this project will track the fruits along the video sequence and give them unique IDs so that a total count of the number of fruits can be obtained. The final application will create a map of the production.

This project will be done in collaboration with the Image Processing Group (GPI) from the **Universitat Politècnica de Catalunya** (UPC) and the Research Group in AgroICT & Precision Agriculture (GRAP) from the **Universitat de Lleida** (UdL).

There is a possibility to partially complement the work in this TFM with a grant associated to the TEC project at UdL "PRECISION AGRICULTURE TECHNOLOGIES TO OPTIMIZE CANOPY MANAGEMENT AND SUSTAINABLE CROP PROTECTION IN FRUIT ORCHARDS (Ref. RTI2018-094222-B-I00)".

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