Sureveg Project

"Robot localization in changing organic strip-cropping environments through point clouds"

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Objective

Estimate the position of the robot in row crops despite continuous changes in the environment (due to wind or small plant growth), using global point clouds (previously obtained all-terrain) and local point clouds (from one part of the ground obtained during the advance of the robot), in fertilization tasks.

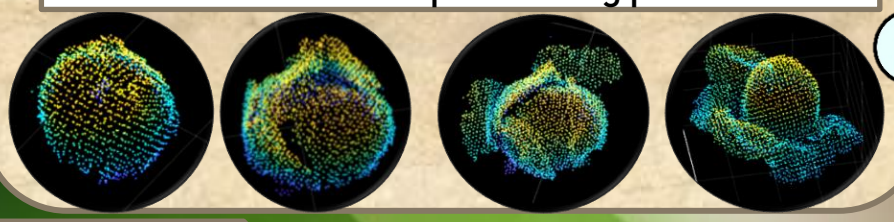
Methodology

To develop robotics tasks in agriculture, it is essential to know the robot position in the environment, which tends to change slightly due to environmental or plant conditions.

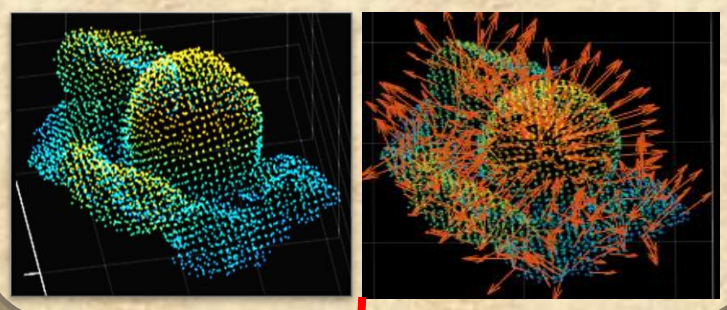
- The proposed system obtains the point clouds, eliminates outliers and performs a sample decrease to improve recognition.
- Normal and uniform distributions are established for point clouds.
- The match score is determined using the transform estimate and gradients to update the transform estimate (cyclical).
- The sectional map is aligned with the global map, stitched and updated based on the changes detected in a short period time.

Planted vegetables of different sizes

3D reconstruction of plants using point clouds

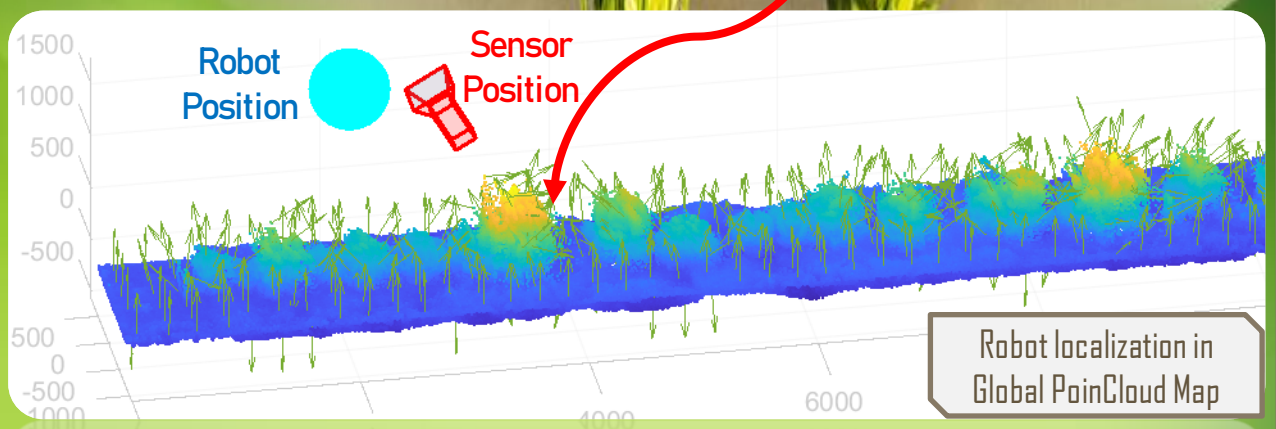


Normals and Features extraction from the plant



Results

Results show that using the adequate extraction of characteristics in global and local point cloud maps, it is possible to determine the robot's relative position for fertilization tasks (blue) and the sensor (red) concerning the crop. This technique has applications in a variety of crops due to wind or small plant growth.



Robot localization in Global PoinCloud Map

Financial support for this project is provided by funding bodies within the H2020 ERA-net project, CORE Organic Cofund, and with cofunds from the European Commission.