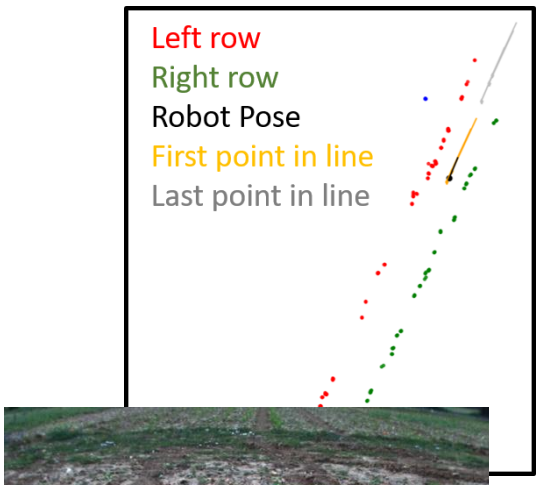
WeLASER
Eco-innovative weeding with laser

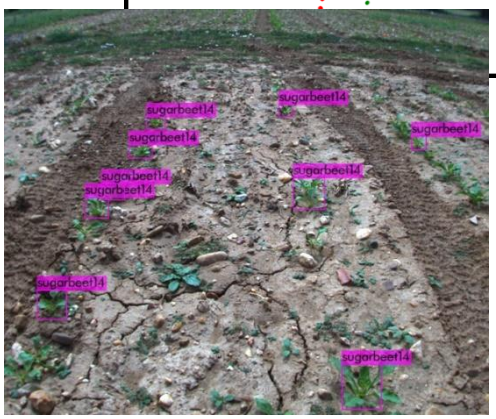
Practice Abstract N. 52

Crop row detector and follower

The problem

To ensure precise navigation in the crop field with fully autonomous robotic systems, it is necessary to know apriori the map of the working environment. Given that the localization system per excellence is the Global Navigation Satellite System (GNSS), these maps consist of geodetic coordinates.
In the case of carrying out treatments on the crop that has already emerged, it is also necessary to know the exact positions of each crop line to avoid damage, especially in wide-row crops. Practice Abstract N. 48 presents a methodology for manually obtaining the latitude and longitude coordinates of the desired points in the field. This methodology also contemplates obtaining the crop line characteristics, but it is hard work for the operator in large fields, so a solution must be found.





The solution

Thanks to new advances in artificial intelligence, it is possible to use various strategies that allow crop detection from color camera images. One such method is called object detection and was introduced in Practice Abstract N. 23, where a model based on deep learning techniques was trained to detect early-stage maize and sugarbeet crops. The detection is done by analyzing the color image. Once the pixels that represent the target crop have been identified, the coordinates of each pixel are obtained using a 3D camera (time-of-flight) calibrated with the color camera. These coordinate make up a 3D point cloud. A set of filters and line estimators are applied to obtain each crop line's characteristics so that the process to get the exact positions of each crop line is automated.

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