Introduction

Main goal of this project was to define the viability of a pre-existing robot which is able to count and measure volume of tomatoes. Several aspects were taken into account: suitable data quality, good precision and fast computation time. Main application are harvesting and forecasting.

Robot description

To a rectangular frame is fixed a linear actuator that allows camera to move horizontally. A stepping motor inside the base unit permits vertical movement. After capturing frames, cluster analysis and LASSO regression are realized. Our performance indicator is the error between predicted and actual value.

Data quality

Sets of data must be correctly acquired in order to ensure a reliable quality. During this project, main obstacles solved were vibration, overlapping of frames and lighting condition. As shown in the frames, incorrect illumination results in wrong labeling.

Computation time

Numerous parameters were considered to have a non-negligible effect on computation time: labels, features, number of images and train/test ratio. To qualify their influence, mean error [%] was plotted as a function of time. For instance, with the number of features, the dilemma “fast computation” versus “high precision” is highlighted.

Adaptation to field

The robot is not well adapted to field conditions. Some improvement concerning the design or the connectors must be done. Also green tomatoes were not tested although it is an important aspect for forecasting.

Conclusion

The algorithm presented in this poster has a never-used approach (many features and depth camera). Based on machine learning, this robotic application shows excellent results when calculating the number of tomato or their volume for important application such as harvesting.