Multi-Object Tracking in Agricultural Scenarios

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Motivation

- The steadily increasing global population imposes new challenges to agricultural and food systems.
- The need for efficient food production is compounded by the decreasing availability of agricultural workers.
- Most applications using autonomous robots are developed in urban and industrial automation scenarios.
- Relevant applications in agriculture are: automated spray of pesticides or fertilizer, and fruit counting.
- Reliable object tracking is required since the plants and fruits should be sprayed or counted exactly once.

Background

- The use of autonomous robots in agricultural scenarios is still under-explored.
- The most recent detection and tracking methods rely on deep learning-based computer vision models.
- Although object detection is a challenging task, it can be performed more effectively than object tracking.
- The challenges of object tracking applications are mostly false or missed detections and occlusions.

Methodology

As a case study, we focus on one of the largest publicly available datasets for plant tracking: LettuceMOT [1].

Our current tracking experiments are based on modified versions of Tracktor++ [2].

Results

Qualitative results sequence 1 (straight2):

Qualitative results sequence 2 (B&F1):

Quantitative results compared to the best result in [1]: ByteTrack+NSA Kalman Filter.

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Broader Impacts, Conclusions, and Future Work

Recent contributions like the lettuceMOT benchmark have helped the exploration of methods for automated robot spraying of pesticides or fertilizers in agricultural fields. The advance in tracking methodologies for applications such as this allows for more reliable automation of food production.

We have presented a modified version of the well-known tracker Tracktor++. Our preliminary experiments show state-of-the-art tracking performance in the LettuceMOT dataset.

We are conducting a more extensive set of experiments using this and other similar datasets like the Apple MOTS dataset to validate our method with higher significance and reliability.

References
