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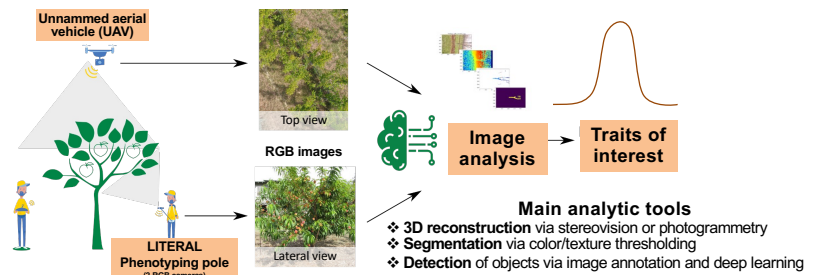
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Context and objectives

Digital phenotyping has the potential to sustain the use of genetic resources for fruit tree breeding by increasing the throughput and the accuracy of phenotypic measurements. The aim of this study is to assess the potential of Red-Green-Blue (RGB) cameras to measure trunk circumference and flower density in apricot and peach orchards using two complementary vectors providing top and lateral views of the trees.

Rationale and method overview



Estimation of trunk circumference

Correlations between empirical and estimated values are high, but error is too large for practical use. We are currently working on improving wood segmentation by using different segmentation models and optimizing our annotation database.

Estimation of flower density with LITERAL

Field score	Score via clustering			
	1	2	3	4
1	8	4	0	0
2	12	22	8	2
3	0	9	9	6
4	1	4	1	5

→ Precision of 0.48
We currently work on a wider testing of the approach (image acquisition and modelling)

Estimation of flower density with an UAV

→ Correlation between observed and predicted values remained low (0.3). Errors are likely caused by:

- (1) Bad quality of tree reconstruction
- (2) Confusion between wood and flower colors

Discussion & outlook

Ongoing works have identified several strategies to target flowering and vigour traits with lateral and aerial RGB acquisitions. We currently work on improving wood segmentation for trunk circumference estimation and the quality of drone acquisitions by increasing image overlap and including LiDAR data. We will also focus on apricot tree architecture by looking at the distribution of long and short branches, which can serve to the estimation of several traits of interested in agronomy and breeding.