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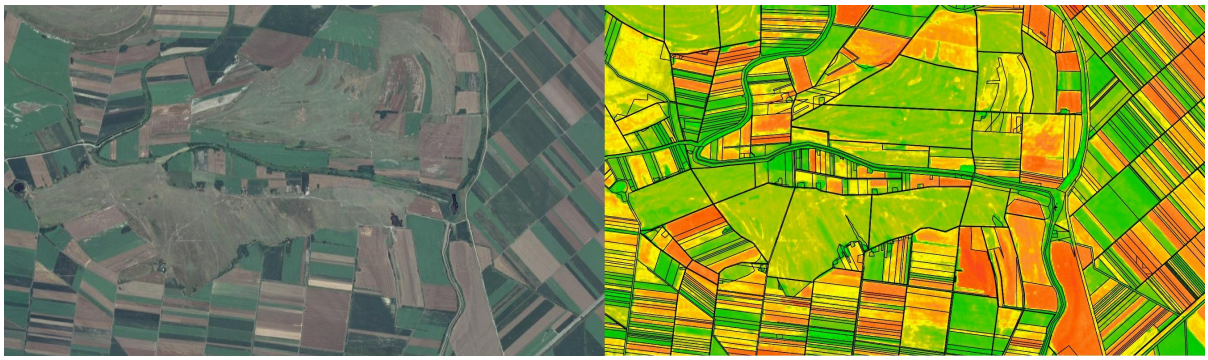
On Plant Detection of Intact Tomato Fruits Using Image Analysis and Machine Learning Methods



Title	On Plant Detection of Intact Tomato Fruits Using Image Analysis and Machine Learning Methods
Title (native language)	
Category	• Recording or mapping technology
Short summary for practitioners (Practice abstract) in English)	In this study, we aimed to develop a method to accurately detect individual intact tomato fruits including mature, immature and young fruits on a plant using a conventional RGB digital camera in conjunction with machine learning approaches. The developed method did not require an adjustment of threshold values for fruit detection from each image because image segmentation was conducted based on classification models generated in accordance with the color, shape, texture and size of the images. The results of fruit detection in the test images showed that the developed method achieved a recall of 0.80, while the precision was 0.88. The recall values of mature, immature and young fruits were 1.00, 0.80 and 0.78, respectively.
Short summary for practitioners	
Website	
Audiovisual material	
Links to other websites	
Additional comments	
Keywords	Farming equipment and machinery
Additional keywords	Image analysis; Fruit detection; Machine learning; Young fruit; Tomato
Geographical location (NUTS)	EU
Other geographical location	Global
Cropping systems	
Field operations	Harvesting | Crop and soil scouting
SFT users	Farmer | Contractor | Processor
Education level of users	Apprenticeship or technical school education | University education
Farm size (ha)	0-2 | 2-10 | 10-50 | 50-100 | 100-200 | 200-500 | >500

Scientific article

Title	On plant detection of intact tomato fruits using image analysis and machine learning methods
Full citation	Yamamoto, K.; Guo, W.; Yoshioka, Y.; Ninomiya, S. (2014). Sensors (Switzerland), DOI:10.3390/s140712191

Effects of this SFT

Productivity (crop yield per ha)	No effect
Quality of product	No effect
Revenue profit farm income	Some increase
Soil biodiversity	No effect
Biodiversity (other than soil)	No effect
Input costs	No effect
Variable costs	No effect
Post-harvest crop wastage	No effect
Energy use	No effect
CH4 (methane) emission	No effect
CO2 (carbon dioxide) emission	No effect
N2O (nitrous oxide) emission	No effect
NH3 (ammonia) emission	No effect
NO3 (nitrate) leaching	No effect
Fertilizer use	No effect
Pesticide use	No effect
Irrigation water use	No effect
Labor time	Some decrease
Stress or fatigue for farmer	Some decrease
Amount of heavy physical labour	No effect
Number and/or severity of personal injury accidents	No effect
Number and/or severity of accidents resulting in spills property damage incorrect application of fertiliser/pesticides etc.	No effect
Pesticide residue on product	No effect
Weed pressure	No effect
Pest pressure (insects etc.)	No effect
Disease pressure (bacterial fungal viral etc.)	No effect

Information related to how easy it is to start using the SFT

This SFT replaces a tool or technology that is currently used. The SFT is better than the current tool	no opinion
The SFT can be used without making major changes to the existing system	no opinion
The SFT does not require significant learning before the farmer can use it	disagree
The SFT can be used in other useful ways than intended by the inventor	no opinion
The SFT has effects that can be directly observed by the farmer	no opinion
Using the SFT requires a large time investment by farmer	agree
The SFT produces information that can be interpreted directly	no opinion

View this technology on the Smart-AKIS platform.

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