

*Editorial*

# Computer Vision Problems in Plant Phenotyping, CVPPP 2018

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Plant phenotyping is the identification of effects on the phenotype (i.e., the plant appearance and behavior) as a result of genotype differences (i.e., differences in the genetic code) and the environment. Previously, the process of taking phenotypic measurements has been laborious, costly, and time consuming. In recent years, non-invasive, image-based methods have become more common. These images are recorded by a range of capture devices, from small embedded camera systems to multi-million Euro smart-greenhouses, at scales ranging from microscopic images of cells, to entire fields captured by UAV imaging. These images need to be analyzed in a high throughput, robust, and accurate manner.

UN-FAO statistics show that according to current population predictions we will need to achieve a 70% increase in food productivity by 2050, simply to maintain current global agricultural demands. Phenomics – large-scale measurement of plant traits – is a key bottleneck in the knowledge-based bioeconomy, and machine vision is ideally placed to help [12]. However, the challenges arising differ from the usual tasks addressed by the computer vision community, due to the requirements posed by this application scenario.

Dealing with these new problems has spawned specialized workshops such as Computer Vision Problems in Plant Phenotyping (CVPPP) and the stand-alone workshop IAMPS (Image Analysis Methods for the Plant Sciences) now in its fifth year. CVPPP is regularly held in conjunction with top CV conferences (ECCV 2014, BMVC 2015, ICCV 2017). This year CVPPP returns to BMVC.

The goal of this workshop is to not only present interesting computer vision solutions, but also to introduce challenging computer vision problems in the increasingly important plant phenotyping domain, accompanied with benchmark datasets and suitable performance evaluation methods.

Together with the workshop, permanently open challenges are addressed: the leaf counting (LCC) and leaf segmentation challenges (LSC) (see <https://competitions.codalab.org/competitions/18405> and <https://www.plant-phenotyping.org/datas>

In the following we briefly describe the papers received in the main call. Papers and extended abstracts can be downloaded from the workshop website (<https://www.plant-phenotyping.org/CVPPP2018-programme>).

## 1 Regular call

Of the 10 full papers presented in CVPPP 2018, seven [2, 4, 10, 11, 15, 20, 21] responded to our open call's computer vision for plant phenotyping topics and three [9, 23, 25] address one or both of the challenges. All submissions, including short papers and extended abstracts, were double-blind peer reviewed by at least two external reviewers. The committee then ranked papers and rejected those that did not receive sufficient scores of quality and priority as suggested by the reviewers. Overall, at present the program includes 7 full papers [2, 4, 9, 15, 21, 23, 25] that are presented as orals and 3 full papers [10, 11, 20] presented as posters. In addition, 14 short papers and extended abstracts [1, 3, 5, 6, 7, 8, 13, 14, 16, 17, 18, 19, 22, 24] are presented as posters. The full schedule and links to papers are available at: <https://www.plant-phenotyping.org/CVPPP2018-programme>.

This year, there has been particular interest in deep learning [2, 4, 9, 11, 20, 23, 25], affordable or low-cost approaches to plant phenotyping [2, 6, 15, 18] and specialized imaging techniques [3, 8, 15, 16, 21, 24].

## 2 Acknowledgements

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