

The Bioinformatics Lab at the Technical University of Munich, TUM Campus Straubing for Biotechnology and Sustainability and the Weihenstephan-Triesdorf University of Applied Sciences is looking for a candidate for a Bachelor's or Master's thesis with the topic

## Impacts of Shadows in Plant Phenotyping using UAV

at the earliest possible date.

The usage of UAVs (Unmanned Aerial Vehicles) has high potential in precision agriculture. They are used by farmers for easy and quick monitoring of their fields and help with sustainable agriculture. One downside of (especially small) UAVs compared to land vehicles is the high dependency on weather conditions.

In this thesis you will address the impact of shadows of crops, which is one of the main difficulties that occur on UAV image data. They do not only make the ground truth generation more difficult, but have also an impact on the precision of deep learning models.

There are many de-shadowing techniques that can be used to pre-process images. After familiarizing yourself with different methods, you will generate a benchmark for the models based on a weed detection dataset. A summary of methods can be found in Shahtahmassebi, AmirReza, et al., 2013, "Review of shadow detection and de-shadowing methods in remote sensing."

<https://link.springer.com/content/pdf/10.1007/s11769-013-0613-x.pdf>

### Your tasks:

- Literature research on shadow detection
- Labeling of data to generate a ground-truth for de-shadowing
- Implementation of machine learning based methods to remove shadows from images
- Comparison of the implemented methods

### Your skills:

- You are close to finishing your Bachelor's/ Master's degree in a technical field
- Strong programming knowledge in Python
- Ability to work and learn new topics autonomously
- Proactive, goal-oriented and communicative way of working
- Good language competence in English, written as well as spoken