Interdisciplinary Project – Digital Agriculture

Machine learning & computer vision for smart plant monitoring

IDP project for 2-4 students from the fields of:
- Machine learning & Computer Vision (2-3 students)
- App-/Web-/ & industrial software development (1-2 students)

Tasks:
Computer vision has made great progress in recent years, especially with the application of machine learning. The ability to be more robust and accurate than classical methods under unknown and changing environments make this technique relevant for agriculture. The aim of this project is to determine to what extent plant images are suitable for crop monitoring and hail damage detection. Applied research will focus on how ML models can be trained & adapted as robustly as possible even with limited data sets.

In addition, a method will be developed to standardize differently acquired images in order to make predictions more accurate. With respect to model development, initial research results and data sets can be built upon. Furthermore, the project offers students from the field of app/web development the opportunity to develop a mobile application that meets the current situation of farmers (keyword: radio holes in Germany!). The app should be able to collect field images and transfer them as efficiently as possible to backend servers. Furthermore, in cooperation with students from the machine learning area, it should be evaluated to what extent ML models can be integrated on mobile devices (“edge computing”) and what effects this has on model performance.

Work packages:
- (Brief) literature review & current research trends
- Testing and optimizing model robustness under real-world conditions
- Implement a post-acquisition image standardization method for the data pipeline
- Evaluating AI models on mobile devices
- Developing an app for field use + Concepts of data transfer under difficult conditions

Requirements (depending on work package):
- (Good) knowledge of Python and Pytorch
- (Good) knowledge in machine learning, CNNs, computer vision
- (Good) knowledge in Kotlin or Java
- Motivation for agricultural topics

Contact & Infos:
Start from now on (20.10.2021)!
Please send a short mail including CV, professional background and motivation to malte.von.bloh@tum.de
Supervisor:
Prof. Senthold Asseng / Malte von Bloh