

Master thesis in computer vision for agriculture

Starting date: as soon as possible
Duration: 6 months minimum (can be increased to 12 months if student is interested)
Working Place: Posieux or Tanikon (home office possible)
Language: English
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Utilizing Deep Learning-Based Semantic Segmentation for Dynamic Monitoring of Crop Canopy Cover in Canola and Faba Bean Fields

Precision agriculture has emerged as a critical approach to enhancing agricultural productivity and sustainability. In this context, semantic segmentation, a computer vision technique that classifies each pixel in an image into a predefined category, holds immense potential for monitoring crop health and development. This thesis aims to explore the application of deep learning-based semantic segmentation models for dynamically monitoring crop canopy cover in raps and faba bean fields.

Objectives:

- Develop a deep learning-based semantic segmentation model for the classification of canola, faba bean, and soil in field images.
- Evaluate the performance of the proposed model using a dataset of field images acquired over time.
- Analyze the dynamic changes in crop canopy cover and their relationship with crop growth and yield.

Methodology:

- Data Collection: we already have a big dataset of images annotated with segmentation masks.
- Data Preprocessing: Preprocess the images to ensure consistency in size, format, and color calibration.
- Model Development: Employ a deep learning architecture, such as U-Net or DeepLabV3+, for semantic segmentation.
- Model Training: Train the model using the preprocessed image dataset, optimizing hyperparameters for improved performance.
- Model Evaluation: Evaluate the trained model's performance on a separate validation dataset, assessing its accuracy and robustness.
- Analysis in context: the results of the developed models will be used by other researchers' experts in the agricultural field to draw conclusions about their research.

The student will be supervised by a computer vision researcher as well as an agricultural researcher. We will also provide a proper computing infrastructure as well as guidance in developing and deploying these models.

