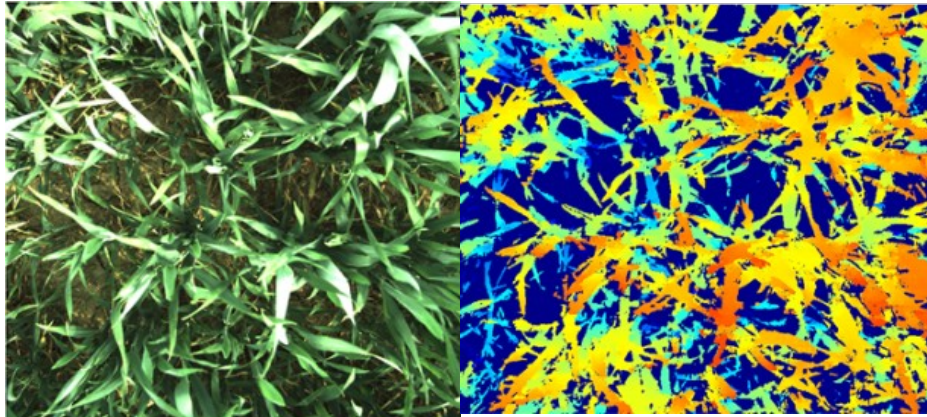Internship 2019

Detection and quantification of crops diseases with Deep Learning

CONTEXT

ARVALIS - Institut du végétal is a leading applied research organization in the analysis of sensor data for agriculture. In partnership with INRA (EMMAH Lab in Avignon, France) and HIPHEN (startup), it develops tools and methods using sensors (lidars, cameras, spectrometers,...) integrated on different systems (robots, drones, wireless sensors,...). The

In order to support the agro-ecological transition of French agriculture, it is necessary to improve disease control by innovating production methods. An important area for improvement is the search for more resistant varieties.

Evaluating the performance of cultivated varieties or crop protection products is an important activity at the French level (France is the world's leading exporter of seeds) and worldwide. In France, 10 million test plots are set up and monitored. Accelerating and improving characterization tools and methods is therefore strategic.

Barley Yello Dwarf Virus is a virosis transmitted by aphids arriving on young straw cereals in the autumn, is highly damaging. It causes yellowing, redness, dwarfism and loss of feet and/or poor grain filling. The average yield loss measured in the Arvalis trials was 31 q/ha on barley and 17 q/ha on wheat.

Example of the virus effects

In the context of LITERAL projects, a sensor combining two RGB cameras and a multispectral camera will be used to acquire data on the disease. One originality is to adapt Deep Learning algorithms to the depth, and multispectral data.

Diagram of the sensing system

Intership goal

Integrated within the INRA - ARVALIS team in Avignon, the intern will participate in the acquisition of data in dedicated experiments. He will also be in charge of the analysis phase, which will integrate analysis methods based on the colorimetry and shape of the objects. Machine learning methods will also be evaluated. The main steps are as follows:

- Participate in the field acquisition of sensor measurements and reference data (March-April)
- Develop a bibliography on disease detection algorithms
- Develop and compare different data processing algorithms, in collaboration with the CAPTE team. The robustness of the methods is an essential point. Ideally, a comparison will be made between a simple image processing algorithm and segmentation algorithms using neural networks.
- Evaluate the quality of the estimates by the system, according to the conditions of use and methods
- Write the internship report and prepare the defense.

Who are you?

You enjoy working in a international and interdisciplinary team. You are rigorous and able to manage a data project, from the supervision of data acquisition to its analysis, based on the technical and scientific skills at your disposal within the CAPTE team.

Student in engineering school (3rd year), or equivalent university degree, you are specialized either in Agronomy, Data Analysis or Image Processing. You already have good data skills in data analysis (mastery of Python and/or R/Matlab) and possibly in image processing. Deep learning skills are a plus but not necessary, internal training will be offered.

Driving licence is a nice to have.

WHEN ? : 6 months (Spring-Summer 2019)

SALARY : approximatly 600 € gross / month + reimbursement of travel expenses related to the internship activities.

WITH WHOM ?

Benoît de Solan – ARVALIS – Agronomist expert

INRA PACA – UMR EMMAH - Domaine St Paul – Site Agroparc – 84000 Montfavet
Tél. 04 32 72 23 66 - Mobile 06 86 63 64 30 - b.desolan@arvalisinstitutduvegetal.fr

Etienne David – ARVALIS - PhD Deep Learning

e.david@arvalisinstitutduvegetal.fr

And…

UMT CAPTE is a mixed technology unit housed in INRA's EMMAH laboratory. It brings together researchers from INRA, Arvalis and Hiphen. The centre is located in Montfavet, about fifteen minutes from Avignon city centre. Its scientific director is Frédéric Baret.

Possibility of extending this work in the form of a contract or PhD depending on the results of the internship.

CV and Motivation letter before 30th January to e.david@arvalisinstitutduvegetal.fr or b.desolan@arvalisinstitutduvegetal.fr