Internship: Plant row detection with a neural network

Contract type: Internship

Level of qualifications required: Bachelor's degree or equivalent

Function: Internship Research

About the research centre or Inria department

The Centre Inria de l'Université de Grenoble groups together almost 600 people in 22 research teams and 7 research support departments.

Staff is present on three campuses in Grenoble, in close collaboration with other research and higher education institutions (Université Grenoble Alpes, CNRS, CEA, INRAE, …), but also with key economic players in the area.

The Centre Inria de l'Université Grenoble Alpe is active in the fields of high-performance computing, verification and embedded systems, modeling of the environment at multiple levels, and data science and artificial intelligence. The center is a top-level scientific institute with an extensive network of international collaborations in Europe and the rest of the world.

Context

The agricultural industry is increasingly embracing digital technologies to enhance productivity, manage uncertainties, and adapt to evolving regulatory frameworks. One specific challenge faced by farmers is the need to reduce the use of biocidal products in their production methods. To address the issue of weeds, precision hoeing (mechanical weeding) presents a viable and easily implementable solution. This approach relies on simple equipment, the hoe, coupled to a tractor through a hydraulically shifted support controlled by a camera that detects crop rows.

Assignment

The objective of this internship is to detect crop rows during the advancement of the hoeing machine to generate commands for controlling the translation cylinder. Specifically, we will adapt a CNN detector (e.g., Yolo) to identify the position of crop rows in images without the need for individual plant detection, and without the need for post processing detection results. The system targets a real-time application in an embedded setting, so much attention must be given to select neural network architectures that can be optimised for fast inference times.

Main activities

To achieve this goal, you will: (1) conduct a comprehensive review of neural network architectures applicable to our problem, and (2) implement a row detection algorithm by adapting and training a state-of-the-art NN architecture with synthetic images.

If the results are positive, your algorithm may be deployed on a low-power ARM-base single board computer and tested on a farm located in Pontcharra.

Skills

- Currently pursuing a M1 or M2 degree in computer science, electrical engineering, robotics, or a related field.
- Good programming skills in Python, C++ or similar
- Familiarity with computer vision, machine learning and neural networks
- Solid understanding of mathematics, especially linear algebra and statistics.
- Strong problem-solving skills and the ability to work both independently and in a collaborative team environment.
- Excellent communication and presentation skills.

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
Professional equipment available (videoconferencing, loan of computer equipment, etc.)
Social, cultural and sports events and activities
Access to vocational training
Social security coverage

Remuneration
Gratification = 4,05€ gross / hour

General Information
- Town/city: Montbonnot
- Inria Center: Centre Inria de l'Université Grenoble Alpes
- Starting date: 2024-01-01
- Duration of contract: 6 months
- Deadline to apply: 2023-11-30

Contacts
- Inria Team: SED-RAL (DGD-I)
- Recruiter: Borkowski Stanislaw / stan.borkowski@inria.fr

About Inria
Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success
How to apply:
Please send your application including
- Mandatory: Complete CV
- Mandatory: Letter of motivation (at most one page)
- Recommended: Degrees and lists of grades (translated to English or French)
- Recommended: Name and e-mail address of at most two references

Warning: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

Instruction to apply
Applications must be submitted online via the Inria website. Processing of applications submitted via other channels is not guaranteed.

Defence Security:
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy:
As part of its diversity policy, all Inria positions are accessible to people with disabilities.