Department	School of Computing
Supervisors	Valerio Giuffrida
Project Title	Image-based plant analysis for sustainable agriculture

PROJECT DESCRIPTION

Image-based plant phenotyping concerns the quantification of non-distructive plant traits (e.g. leaf area, number, colour). This approach enables deciphering the complex genetic-environment interactions influencing its performance and finding the best-adapted crop varieties to local environmental constraints for sustainable agriculture. However, plant trait quantification is often performed manually by plant researchers and agronomist, which is time-consuming and error-prone.

Deep learning methods are necessary to speed up analyses from large image datasets. For this PhD project, we are looking for a motivated student with expertise in deep learning to develop classification, segmentation, and regression models for plant image analysis. The successful candidate should be experienced with a major deep learning library for python.

The candidate will have access to plant datasets provided by external national and international collaborators and it is expected to have a teamwork skills.

Prospective applicants are encouraged to contact the Supervisor before submitting their applications. Applications should make it clear the project you are applying for and the name of the supervisor(s).

Academic qualifications
A first degree (at least a 2.1) ideally in computer science (with a specialisation in AI) with a good fundamental knowledge of machine learning.

English language requirement
IELTS score must be at least 6.5 (with not less than 6.0 in each of the four components). Other, equivalent qualifications will be accepted. Full details of the University's policy are available online.

Essential attributes:
- Experience of fundamental machine learning and deep learning.
- Competent in python programming
- Knowledge of major downstream computer vision tasks, such as classification, segmentation, detection.
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Desirable attributes:
- Working knowledge of adversarial training.
- Working knowledge of probability and statistics.
- Knowledge of transfer learning.

Indicative Bibliography	Litrico, Mattia, Sebastiano Battiato, Sotirios A. Tsaftaris, and Mario V. Giuffrida 2021. "Semi-Supervised Domain Adaptation for Holistic Counting under Label Gap" Journal of Imaging 7, no. 10: 198. https://doi.org/10.3390/jimaging7100198

	Mario Valerio Giuffrida, Andrei Dobrescu, Peter Doerner, Sotirios A. Tsaftaris (2019) "Leaf Counting Without Annotations Using Adversarial Unsupervised Domain Adaptation," CVPPP workshop in CVPR. Thibaut Bontpart, Cristobal Concha, Mario Valerio Giuffrida, Ingrid Robertson, Kassahun Admkie, Tulu Degefu Abdi, Nigusie Girma Wordofa, Kassahun Tesfaye, Teklehaimanot Haileselassie Teklu, Asnake Fikre Woldemedhin, Masresha Fetene, Sotirios A. Tsaftaris, Peter Doerner (2020) "Affordable and robust phenotyping framework to analyse root system architecture of soil-grown plants," The Plant Journal.
Enquiries	For informal enquiries about this PhD project, please contact Valerio Giuffrida at v.giuffrida@napier.ac.uk
Web page	https://www.napier.ac.uk/research-and-innovation/research-degrees/application-process