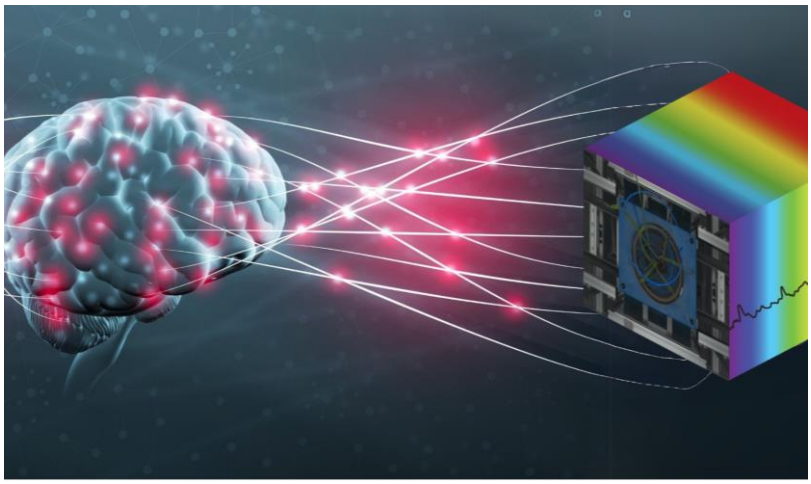
NovaUCD

Technology Licensing Opportunity

Hyperspectral Image Segmentation in Agriculture

- Method to accurately extract and identify plant traits from hyperspectral images



Opportunity:

Plant phenotyping measures complex traits in plants. The advent of high-throughput phenotyping (HTP) has revolutionised the field by allowing rapid, non-destructive, and automated measurements of plant traits across large populations. HTP leverages advanced imaging technologies, such as hyperspectral imaging, to capture detailed plant growth, physiology, and stress responses, including diseases and nutrients. Despite its advantages, HTP faces significant challenges, ranging from data analytics to image analysis and segmentation.

To accurately process and segment hyperspectral images, UCD researchers have developed a hybrid deep learning (DL) architecture with improved precision compared to existing methods. The architecture uses advanced features such as attention mechanisms, edge detection and data fusion to handle challenges including overlapping leaves and complex plant structures. It also employs automated imaging hardware and optimised algorithms for faster and more reliable results.

Applications

The architecture has multiple applications where hyperspectral imaging is deployed in sustainable agriculture such as crop health and land use monitoring. Alternative applications include remote sensing and satellite imaging.

Key Features/Advantages of the DL architecture:

- Dual channel that can process multiple datasets at once, leading to a more precise segmentation. Advantageous in accurately monitoring stress and plant health.
- Significant reduction computational demand while enhancing the models ability to focus on relevant features within the image.
- Outperformance of existing in demand solutions, offering more precise segmentation, rigorous vegetation indices and analytical plant traits.

FUNDERS: Taighde Éireann Research Ireland

March 2025

Value Proposition:
The UCD architecture accurately segments hyperspectral images, leading to improved analytical plant traits. High-precision and segmentation accuracy with lower computational time compared to current in demand solutions.

Market:
Industries that deploy hyperspectral imaging such as crop monitoring, remote sensing, satellite imaging and data analytics for agricultural sustainability.

Inventors:
Dr Sónia Negrão and Dr Jason Walsh, UCD School of Biology and Environmental Science and Prof. Eleni Mangina, UCD School of Computer Science.

IP Status/Publication:
European Patent Application No. 24178975.9 filed on 30 May 2024.

Contact:
Dr Stacey Kelly
Case Manager
Knowledge Transfer
t: + 353 1 716 3705
+35387 406 1714
e: stacey.kelly@ucd.ie

Rialtas na hÉireann Government of Ireland
Arna chomhchistiú ag an Aontas Eorpach
Co-funded by the European Union
Tionól Réigiúnach an Deiscirt Southern Regional Assembly
Enterprise Ireland