Deep4sat43

A new level of agricultural monitoring and control

The AI Call 2021 project Deep4sat43 (Geo-AI Ecosystem for tree (43) health inspection and early warning) will utilise deep learning (DL) algorithms in a Software as a Service (SaaS) that allows for the monitoring of plant diseases and invasive species among individual trees.

Addressing the challenge

In recent decades, disease and insect-related forest and orchard disturbances have increased in frequency and intensity. However, traditional monitoring and control is limited by a lack of access to expertise and terrain, small spatial coverage, infrequent ground surveys and human subjectivity. To reduce tree mortality, orchard farmers and forest managers require tools for faster diagnosis and control of diseases and anomalies, including at the level of individual trees.

Proposed solutions

Deep4sat43 will enable this via an online SaaS application utilising DL-based algorithms to train models to recognise and localise individual trees that are affected by diseases or invasive species. Building on DL that can detect targeted trees in RGB images from ground robots or drones, the project will create automated DL that can identify spectral and spatial features from satellite images. Localisation will produce geo-referenced information for trees that need attention, while a standardised workflow and automated early warning system will ensure user-friendliness regardless of experience. This platform will be tested in Denmark, the Netherlands, Portugal and Turkey, demonstrating its applicability to different climates, plants, soils, data access and legal requirements. Exploitation will take place according to a B2C (farmers/land operators) and B2B (technology companies) model, integrating satellite data purchasing and storage in one marketplace for companies

offering AI, sensors and unmanned aerial vehicles.

Projected results and impact

First and foremost, Deep4sat43 aims to significantly boost disease control over large areas, thereby increasing

⌃ Deep4sat43 leverages advanced satellite technology to accurately identify and map unhealthy pine trees across vast areas, enhancing forest health.

agricultural production, yield and qality while minimising financial losses. At an individual level, the platform will require just a computer and an internet connection, providing a much better return on investment than drone or robot-based solutions. The simplification of AI and remote sensing will also allow smaller farms with limited expertise to benefit and Deep4sat43's models

will be enriched with other models and existing data to save time and costs in data collection and labelling. Finally, AI can reduce the costs of inspection as resources (including humans and machines) can be allocated to specific trees. At a European level, invasive species cost up to EUR 13 billion annually, offering enormous room for savings via widespread uptake of the project's results. This is aided by the almost complete lack of available services for individual trees and, as the first to offer an application programming interface for

this, Deep4sat43 aims to be the market creator. Alongside the opportunities this presents in market share and competitiveness, sustainability will be boosted in the longer term via the use of fewer pesticides and agricultural resources. The project therefore offers innovation in terms of technology, business and society.

Project partners

The Netherlands

ELLIPSIS DRIVE
for spatial data worth sharing

Spectro**AI**

Denmark

Cellari

Türkiye

btech
analytics

b **BEWELL**
TECHNOLOGY

ÖNDER ÇİFTÇİ
ÖCP
PROJESİ

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TÜBİTAK

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Project leader
Hamed Mehdipoor, Spectro-AG

Project email
h.mehdipoor@spectroag.com

Project website
https://itea4.org/project/deep4sat43.html

Secondary Cluster
EUROGIA

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