APPF
Australian Plant Phenomics Facility

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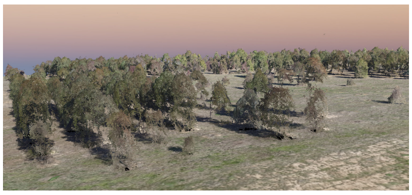
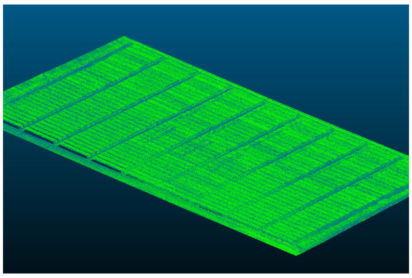
The Australian Scalable Drone Cloud (ASDC)

A use case for scalable, interoperable data architecture with potential general applications beyond drones



In the image directly above, a 3D reconstruction has been created using drone data from flight shown in the top photograph.



Above is a point cloud image showing how using data points collected by a drone can produce a 3D representation or digital model of a site.

The ASDC project which has investment from the NCRIS-funded Australian Research Data Commons (ARDC) and involves three NCRIS facilities and two additional academic partners, is an example of tackling a particular problem for the research community, while supporting innovation and building scalable tools that have potential value and impact in multiple diverse domains (both industry and academia).

A primary goal of the project is to provide a cloud-native tool for anyone to process and manage drone and other 3D data. For the conversion of drone imagery into actionable 3D data, ASDC is expanding on an existing internationally adopted open-source platform - Open Drone Map (ODM). This will create a cloud-native solution with robust user management and integration with commercial and research cloud storage and compute.

In addition to processing drone data, the ASDC will be creating tools to make these data FAIR (Findable, Accessible, Interoperable, Reusable), as well as developing tools for data sharing, analysis and visualisation.

More broadly, the learnings and tools can be applied to technologies and data outputs from a wider array of domains. If handled correctly, 3D data produced by a drone is not substantially different than 3D data produced through any other method (e.g. LiDAR, camera arrays, 3D scanners or even consumer-grade spherical lens cameras). Thus, based on insights from ASDC, robust tool-sets for interacting with 3D data in general and for data from any location (i.e. laboratory, 'smart' glasshouse, field buggy, or fixed environmental monitoring installation) can be built.

All data, independent of origin, can be stored in a standardised 3D storage structure, indexed by their location and time of capture. This enables, for example, creation of VR interfaces for working with data types that are less domain specific (i.e. building a multipurpose 3D data viewer) so users from any domain can intuitively interact with 3D data sets or groups of 3D objects captured by other communities and repurpose these data to address completely new questions. If done correctly, it matters far less whether these objects are individual plants, or trees, or crop fields or an archaeological dig, or mining site.

To further enhance the utility and interoperability of data from the ASDC platform, the data and data catalog will be designed to be discoverable and usable within the EcoCommons initiative, an ARDC-supported platform. By natively integrating EcoCommons data standards into ASDC platform outputs, anyone using the ASDC tools (including uploading any other compatible 3D data to the platform), can seamlessly discover data and launch a virtual analysis environment (using common tools such as GitHub and Jupyter) and then easily make public both data, code and reproducible analysis pipelines.

By focussing on connecting different open-source offerings (that in most cases already exist) to tackle core problems relating to data capture and analysis, it is possible to achieve a significant level of interoperability that has previously been lacking.

Case study prepared by Dr Tim Brown, Australian National University and Dr Susie Robinson, University of Adelaide from the NCRIS-enabled Australian Plant Phenomics Facility (APPF) plantphenomics.org.au

NCRIS
National Research Infrastructure for Australia
An Australian Government Initiative

The ASDC is a partnership of key National Collaborative Research Infrastructure (NCRIS) capabilities including the APPF, Terrestrial Ecosystem Research Network (TERN), and Auscope, as well as Monash University's Monash Drones Discovery Platform, and CSIRO.