

QLUMP BANANA CROP PREDICTION

CASE STUDY

Remote sensing centre with Envista.



Opportunity

The Remote Sensing Centre (RSC) within the Department of Environment and Science (DES) Science Division maps land use and land use change under the Queensland Land Use Mapping Program (QLUMP).

While some automated processes have been developed to assist in mapping land use, the main mapping methodology requires a team of skilled staff to manually interpret satellite imagery and ancillary data, and hand digitise to classify land use features. This process is time and resource intensive.

The ASDI 2 Data Improvements and Machine Learning project initiated a proof of concept to address RSC's problem statement:

Approach

We used a streamlined procurement approach based on the TWIG model, to reduce timeframes:

- A problem statement was provided in the RFQ
- An RSC staff member involved for the duration to agree on the best way to deliver the POC
- Discovery and pitch sessions ensured understanding of whether vendor capability in image processing was suitable for addressing the POC.
- Procurement criteria was weighted to give preference to an SME

The management approach included:

- 8 week engagement with Envista
- Agile approach, bi-weekly project stand ups, 2 showcases and co-location with the RSC

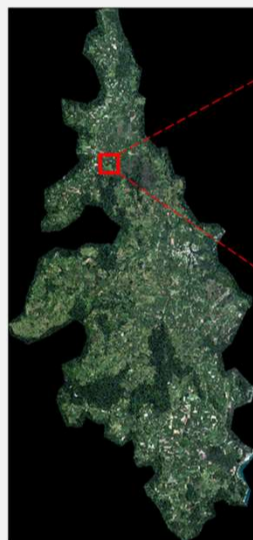
"ASDI has provided RSC with the opportunity to kick start our knowledge and understanding of machine learning applications specific to remote sensing. We now have the capability to apply ML and computer vision methods to segment and classify any satellite image." Andy Clark



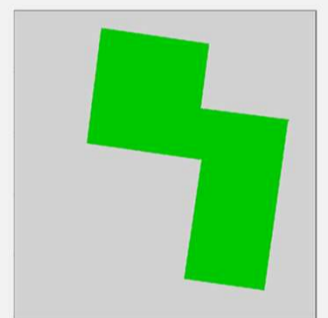
Results

- The first goal of identifying bananas was reached in week 3 – a U-net neural network algorithm was used to predict banana crops to a ~87% accuracy.
- This PoC has identified areas of bananas that existing mapping techniques have missed.
- Knowledge transfer was highly successful. Staff within RSC have improved capability in machine learning and have developed enough capability in a short timeframe to undertake projects themselves (i.e. woody vegetation, identifying a number of land uses within one model).

Inputs for training the model



RGB Satellite image



Banana crop mask



Benefits

- Time and process improvements
- Improved quality – the models can be run more often, hence information will be more up to date
- Staff engaged, excited and confident!
- Other teams that attended showcases were able to see what is possible and are now investigating how they can use machine learning

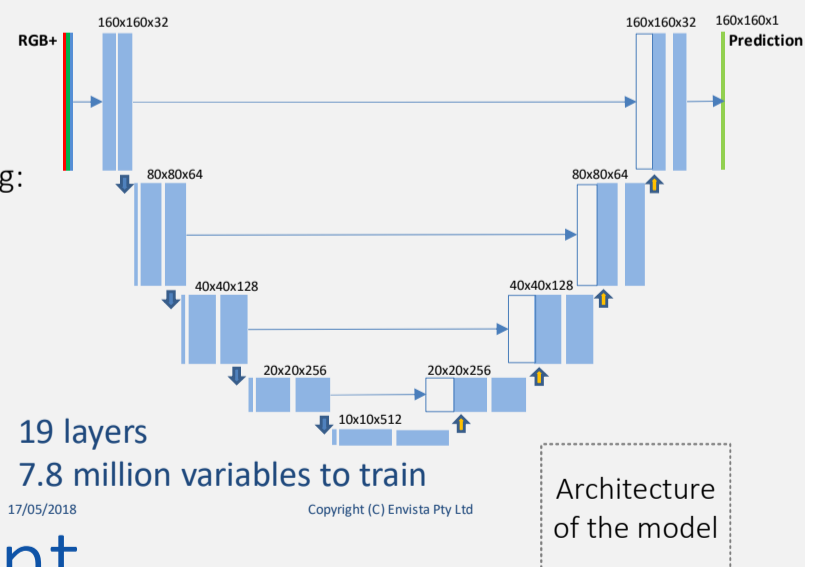
Long term benefits

- More timely and accurate information to support key government priorities including:
- The health of the Great Barrier Reef
- Vegetation monitoring and management e.g. SLATS
- Coal seam gas compliance
- Fire management & disaster impact mapping



Lessons learnt

- Data preparation and quality training data shouldn't be understated
- The infrastructure you use is important! GPU verses CPU 70x faster
- The selected vendor's experience and knowledge was critical to the success of the POC
- Machine learning may not replace current processes, but has the potential to reduce timeframes and provide more confidence in the mapping process.



For more information, contact ASDI@des.qld.gov.au