

# DATA-DRIVEN INSIGHTS FROM DRONE TECHNOLOGY CATAPULT MELBOURNE WATER INTO THE FUTURE

## *Using machine learning to assess vegetation in water*

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Melbourne Water is responsible for managing many wetlands which are vital to reducing flooding. The vegetation within the wetlands also plays a key role in treating stormwater runoff to improve the quality of water entering rivers and ultimately the bay.

Over recent years the increase in Melbourne Water's Unmanned Aerial Vehicle (UAV) or drone program has provided an opportunity to develop a comprehensive, cost-effective and efficient means to monitor vegetation in wetlands.

Melbourne Water, in collaboration with research organisation FrontierSI, developed a deep learning algorithm from open source software which identifies count and species of vegetation from drone technology. The machine learning approach ensures issues are identified, detected and managed early in a consistent and repeatable manner.

The assessment of vegetation in a wetland presents many challenges. Variability is influenced by plant maturity, water levels, lighting and species. Vegetation can be sparse or densely planted, requiring the ability to assess both individual plants and clusters of vegetation. To combat these challenges, image filters are applied to match features such as colour and texture.

The tool then outputs statistics and a heat map to identify areas where plant count or area was or wasn't meeting targets in accordance with design.

The tool analyses a 2GB orthomosaic image in approximately three minutes with machine learning error rates at around 3 per cent. As a comparison, an equivalent human-assessment would take several hours with error rates typically considered to be 5 per cent.

Melbourne Water plans to incorporate the tool into the commissioning stage of newly constructed wetlands. In time, the vision is to have the toolset available to those constructing the wetlands, with the aim of providing immediate feedback prior to handover; essentially a self-assessment tool.

Contact the project team for more details via [Heath.McMahon@melbournewater.com.au](mailto:Heath.McMahon@melbournewater.com.au)