Deep learning and real-world problems: balancing opportunity with responsibility and dodging the hype trap

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ABSTRACT

Artificial intelligence is everywhere, solving (or poised to solve) the hard problems, and threatening to replace all our jobs. Against this background of hype, AI techniques such as deep learning are being quietly applied to a diverse set of domains, including difficult mapping problems such as wetlands, invasive plants and habitat loss.

Deep learning is powerful, but its not magic. For every success, there are multiple failures. Rampant optimism in its abilities has been replaced first with caution, and now is often met with undue scepticism. Proponents and practitioners of deep learning (and AI in general) can now be met with anything from "but company XYZ say they can do that for a fraction of the price" to "we've paid someone to do something similar before and it didn't work – it's all a con".

Despite this somewhat bleak state of affairs, Manaaki Whenua has been quietly applying deep learning to mapping and other computer vision problems for over five years, with more than a dozen projects completed or underway, and several successes on hard problems. We will introduce some of the more contentious projects we have tackled, and discuss how we have managed expectations, and lessons learned from the experience.

ABOUT THE AUTHOR

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Brent Martin is a senior data scientist at Manaaki Whenua Landcare Research. He has more than twenty years of experience in artificial intelligence, machine learning and deep learning. Brent lectured Computer Science at Canterbury University for ten years, teaching artificial intelligence, machine learning, programming and software engineering, and conducting research and development in artificial intelligence-based educational software and games, as well as various machine learning projects. He also has experience in the application of AI and machine learning in various industry and public good contexts, including designing and developing investigative intelligence systems at Jade Software/Wynyard Group, and conducting machine learning projects for

various organisations including Google, Transpower, Plant and Food Research, the Department of Conservation, Cacophony Project and Toitū Envirocare. In his current role at Manaaki Whenua, Brent leads research into deep learning for remote sensing, including automated mapping from satellite and aerial imagery and predator species detection as part of the Predator Free 2050 initiative and related activities. In between research roles, Brent has spent time as a software engineer, manager and architect in several private companies including Digital Equipment Corporation and Hewlett Packard.