

AI for the Environment Hackathon

Environmental problem to solve: Early detection of newly naturalising weeds

Relevant Key Area: Preserving and Bolstering Biodiversity

Problem Statement:

Environmental weeds have serious negative impacts on New Zealand's native species and ecosystems. There are approximately 400 environmental weed species already present in New Zealand, and more weed species naturalise (establish in the wild) or expand their range every year.

Most newly naturalising environmental weeds are not detected until they have become widespread and thus difficult (and expensive) to control. The first step required to solve this problem is to draw from the multitude of weed observation data sets to create a comprehensive map of current weed distributions. This baseline spatial information is a critical precursor to knowing whether new weed observations are significant.

The second step is to automate the process of monitoring new observations and flag those that are the first wild record of that species in New Zealand (or within a region). There are numerous platforms, apps, and websites where people post weed observations, but they are not linked up in any way. Early detection of a new weed species currently relies on luck and/or time-consuming, manual research across multiple platforms.

AI is probably the only solution to this part of a complex problem. The solution will (for now, at least) still rely on people observing and recording weeds. However, having AI working in the background to detect significant observations would add impetus and motivation for the professionals, volunteers, and citizen scientists working to reduce the environmental harm caused by weeds. A robust AI weed alert system will be of global interest.

Desired Outcomes:

1. All georeferenced weed observation datasets are combined to create a New Zealand-wide weed distribution map. That map is automatically updated whenever new weed observations are recorded.
2. New weed observations are automatically monitored and a 'weed alert' is created when a species is recorded for the first time in an area (which could be the whole of New Zealand or an island, region, or ecosystem type). Could add additional relevant information to allow for different alert categories.

Source data:

- a. Open datasets: iNaturalist, NZ major herbaria, GBIF, New Zealand National Vegetation Survey Databank, PlantNet, Facebook weed pages
- b. Closed datasets (requiring permission to access): DOC Weed App and Bioweb data, Regional Council Weed App data, DOC Tier One monitoring data
- c. New Zealand Landcover Database land cover class layers (to flag new invasions in vulnerable ecosystems, but this could be added at a later stage)