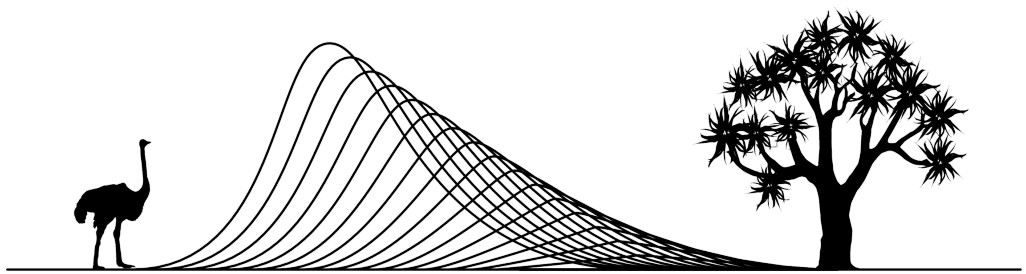
Machine Learning for Ecology

Cape Town Workshop

20-22 November 2017



SEEC - Statistics in Ecology, Environment and Conservation

“May you live in exciting times”

“Starting tabula rasa, our new program AlphaGo Zero achieved superhuman performance, winning 100-0 against the previously published, champion-defeating AlphaGo”

Mastering the game of Go without human knowledge
`www.nature.com/nature/journal/v550/n7676/full/nature24270.html`
17 October 2017

“May you live in exciting times”

- Google Cloud Vision API

  `https://cloud.google.com/vision/`

- Microsoft Computer Vision API

  `https://azure.microsoft.com/en-us/services/cognitive-services/directory/vision/`

Machine Learning for Ecology

Many ecologists spend a lot of time on classification

Used to "identify" species, individual, behaviour

Often done manually

Better classification $\Rightarrow$ Better and faster insights into ecological systems

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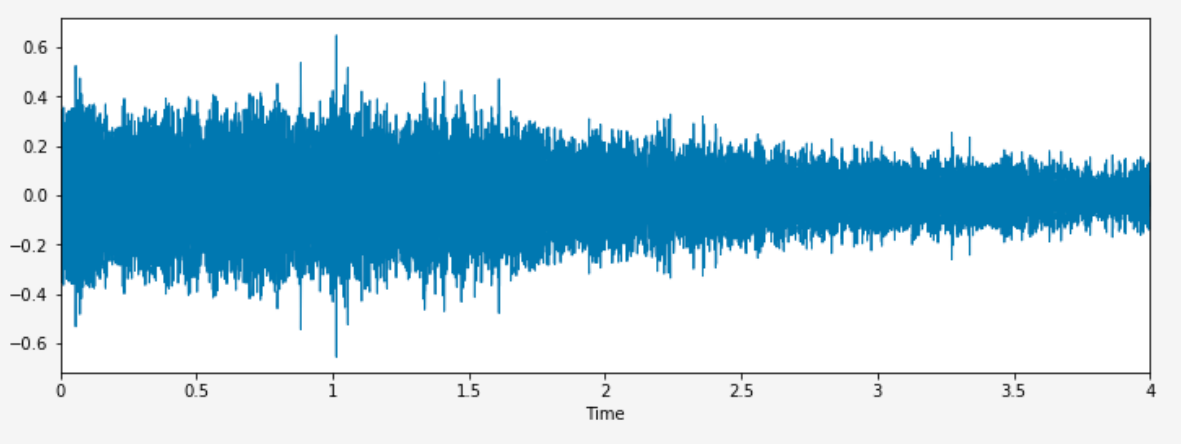
This is the goal of MLfE

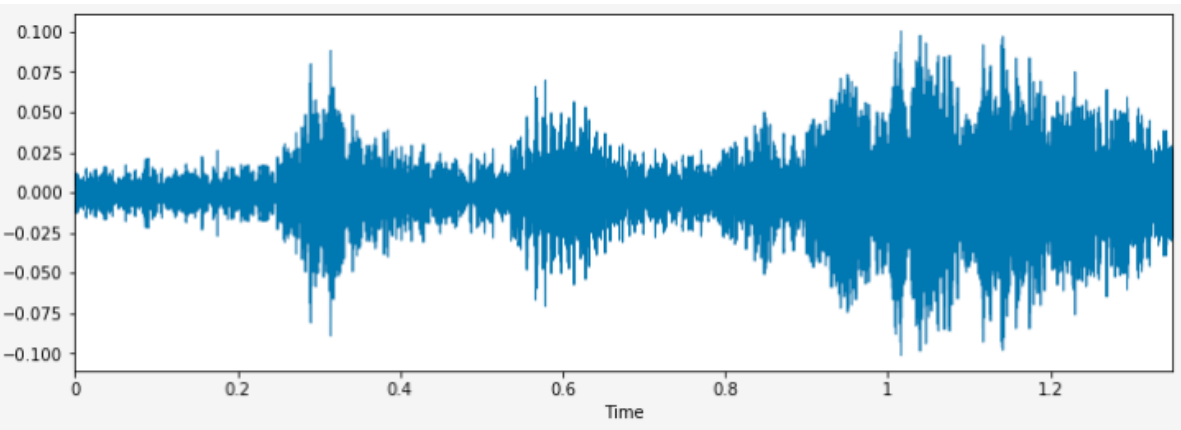
Some examples




Contains invasive species of *hydrangea*?

Some examples





Drilling or dog?

Some examples

Contains a seal?

Workshop goals

- "Remove the aura around machine learning"
- Give you skills and confidence to experiment with ML in your own research

Lots of different background and experience levels, but everyone should improve their ML knowledge in some way

Workshop approach

- Alternating lectures and pracs
- Pracs give you "walk through" code + ask you to adapt or apply to new data
- Experiment and ask questions

Some caveats

- Relatively rare in ecology, may be harder to publish
- Goal is prediction, not inference
- Statistical approaches better for understanding "why"
- We only look at supervised ML

Workshop outline

Monday		
09:30 - 10:30	Lecture	Trees, model validation
11:00 - 12:30	Prac	Trees, model validation
13:30 - 15:00	Lecture	Tree ensembles, variable importance
15:15 - 16:45	Prac	Tree ensembles, variable importance
Tuesday		
09:00 - 10:30	Lecture	Feedforward neural networks
11:00 - 12:30	Prac	Feedforward neural networks
13:30 - 15:00	Prac	Convolutional NNs
15:15 - 16:45	Prac	Convolutional NNs
Wednesday		
09:00 - 09:30	Lecture	Transfer learning, data augmentation
11:00 - 12:30	Prac	Transfer learning, data augmentation
13:30 - 15:00	Lecture	Amazon Web Services, audio classification
15:15 - 16:45	Prac	Audio classification