Machine Learning for Ecology

Workshop at the Centre for Ecological Sciences, Indian Institute of Science, Bangalore

23-25 October 2017

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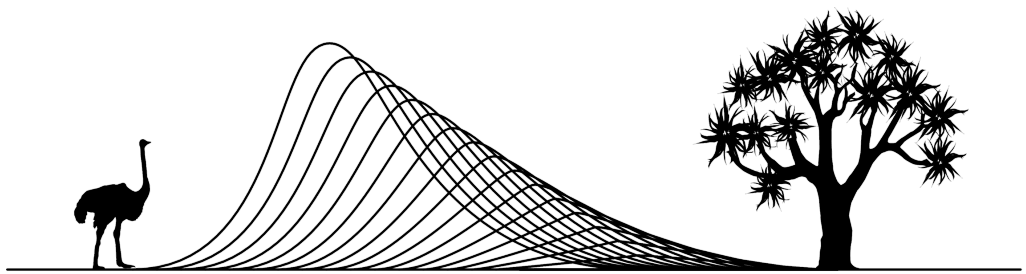


SEEC - Statistics in Ecology, Environment and Conservation

“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

- Supervised learning
  - Relate response variable y to a set of predictors X
  - Aim to predict future responses
- Unsupervised learning
  - No response variable
  - Identify patterns and clusters in the data

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

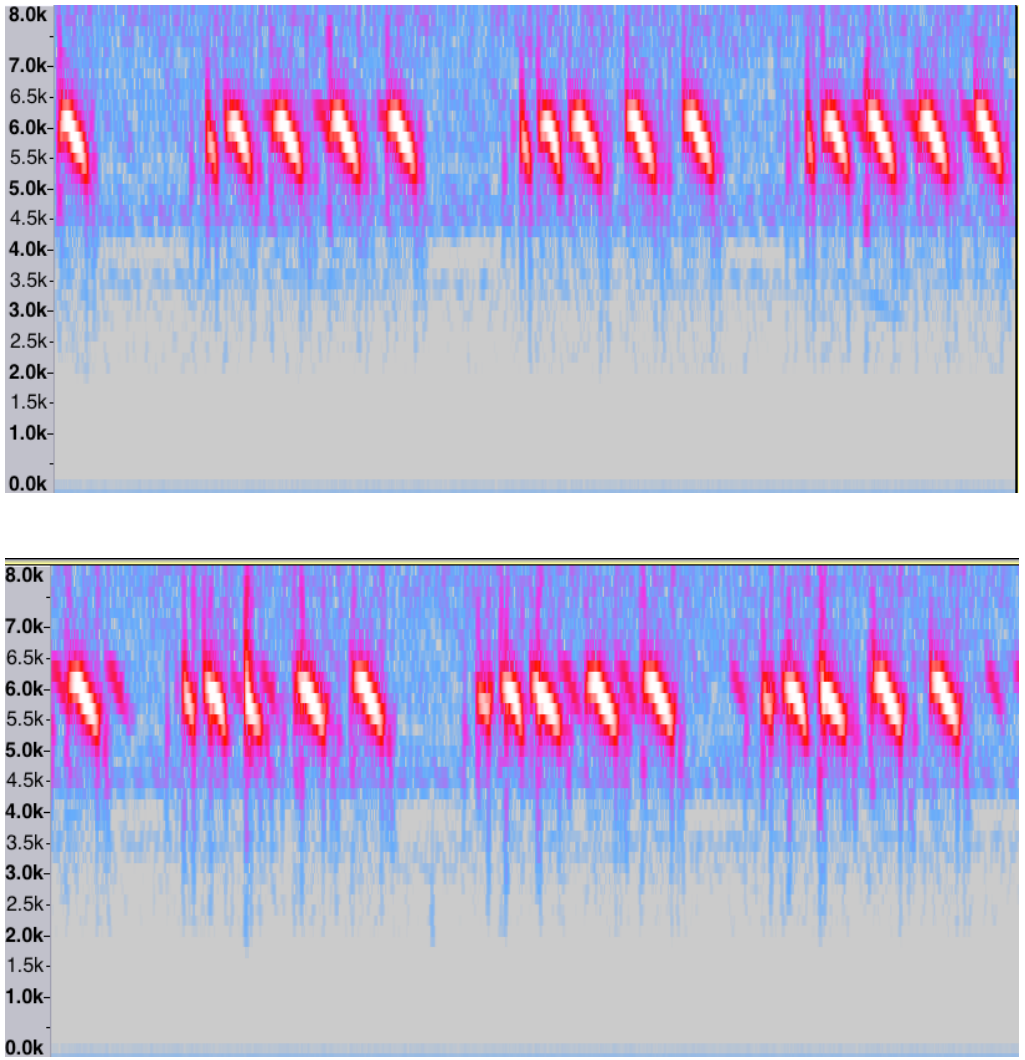
⇑⇑⇑⇑⇑⇑⇑⇑

This is the goal of MLfE

Some examples

West or South coast origin?

Some examples



Same cricket?

Some examples

Contains a seal?

Some caveats

Relatively rare in ecology, may be harder to publish

Goal is prediction, not inference

Statistical approaches better for understanding "why"

Workshop outline

Monday		
09:00 - 09:30	Lecture	Introduction
09:30 - 10:30	Lecture	CART, model validation
11:00 - 12:30	Prac	CART, model validation
13:45 - 14:45	Lecture	Ensembles, variable importance
15:00 - 16:15	Prac	Ensembles, variable importance
Tuesday		
09:00 - 10:30	Lecture	Feedforward neural networks
11:00 - 12:30	Prac	Feedforward neural networks
13:45 - 16:15	Prac	Unseen kaggle-style challenge
Wednesday		
09:00 - 09:30	Lecture	CNNs
11:00 - 12:30	Prac	CNNs
13:45 - 14:45	Lecture	Transfer learning
15:00 - 16:15	Prac	Transfer learning
16:15 - 16:30	Lecture	Summary and farewell