Machine listening for computer music

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Machine Listening Lab

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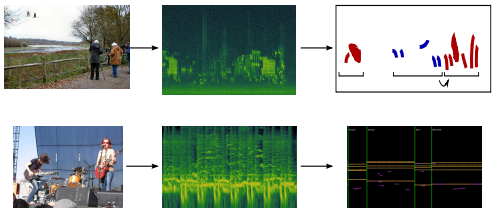
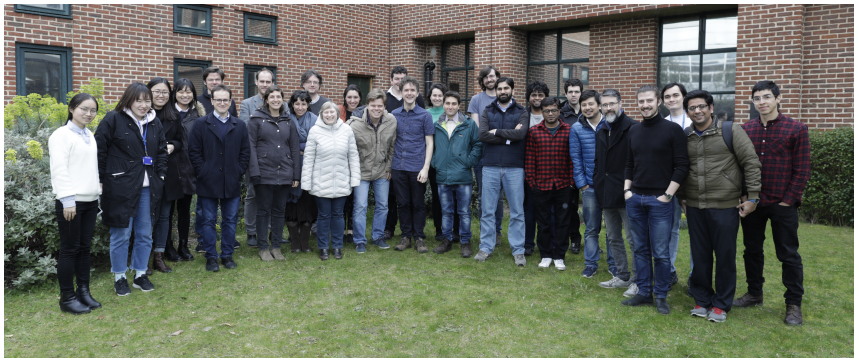
centre for digital music | Queen Mary University of London | CIS centre for intelligent sensing

In the Machine Listening Lab we develop methods for making sense of natural sounds, everyday sounds, and recorded music. ***Machine listening*** is the use of signal processing and machine learning to extract useful information from sound.



- Event detection
- Scene classification
- Species identity
- Interactions
- Source separation
- Event onsets
- Rhythms
- Musical score
- ....



Lead academics:

Dan Stowell

Emmanouil Benetos

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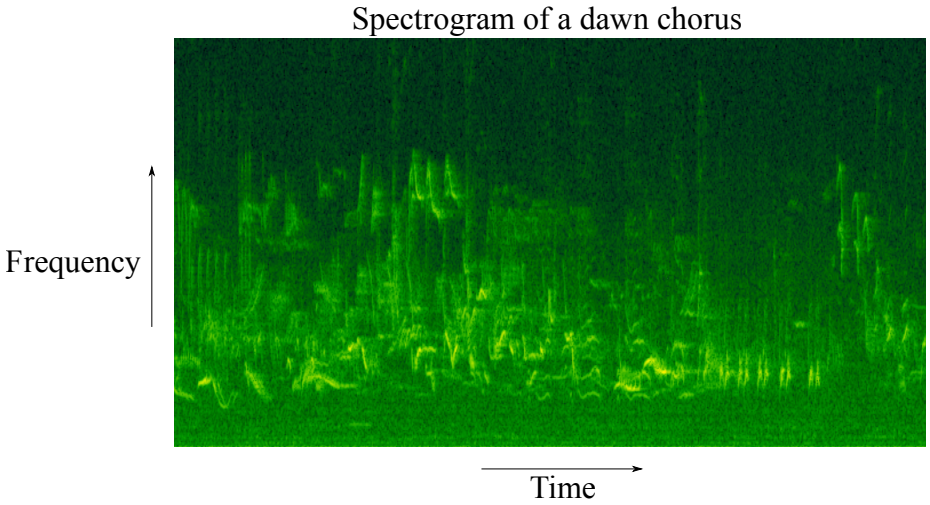
Machine listening: birdsong



- Which species?
- How many birds?
- Singing in response to neighbours?
- Warning about predators?
- Defending a territory, or newly arrived?

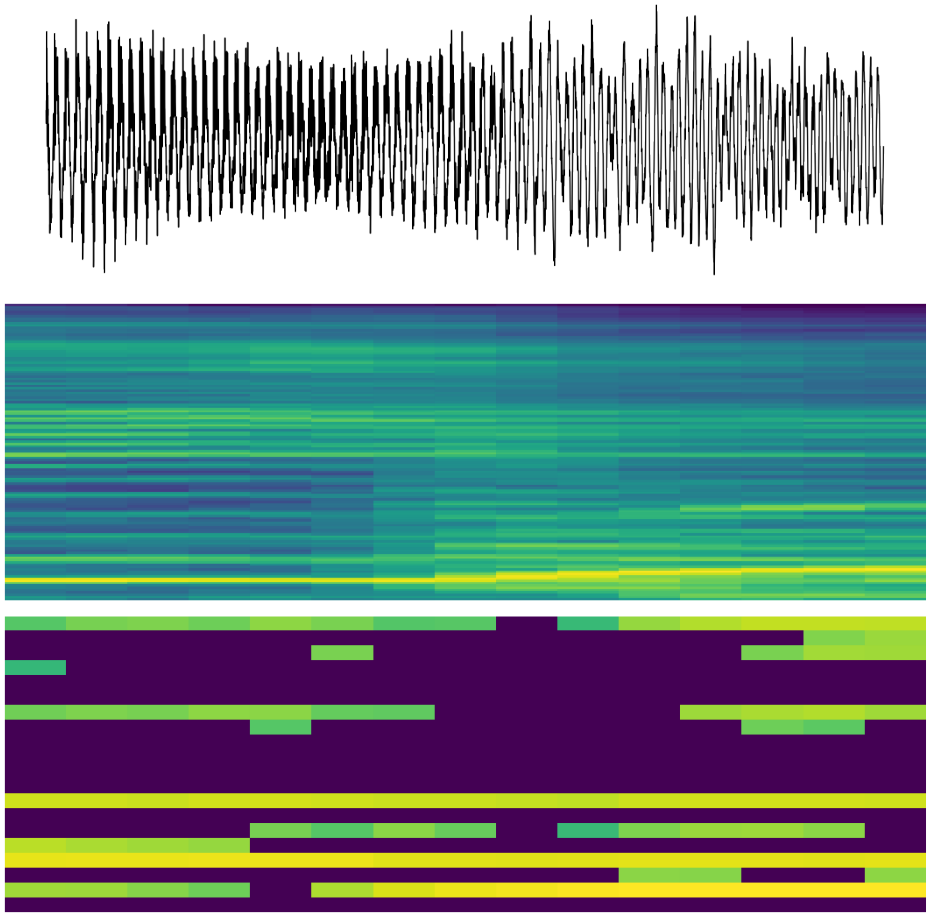
Machine listening: Music information retrieval

- Which instruments?
- Which notes? When?
- How performed? e.g. vibrato, legato, soft/hard
- Unexpected sounds? (e.g. artefact removal)
- Song structure, repetition?

Outline

1. Audio feature extraction
2. Onsets and pitches
3. Machine learning (outline only!), classification and clustering
4. Python demo
5. Non-real-time vs. realtime
6. Automatic music transcription

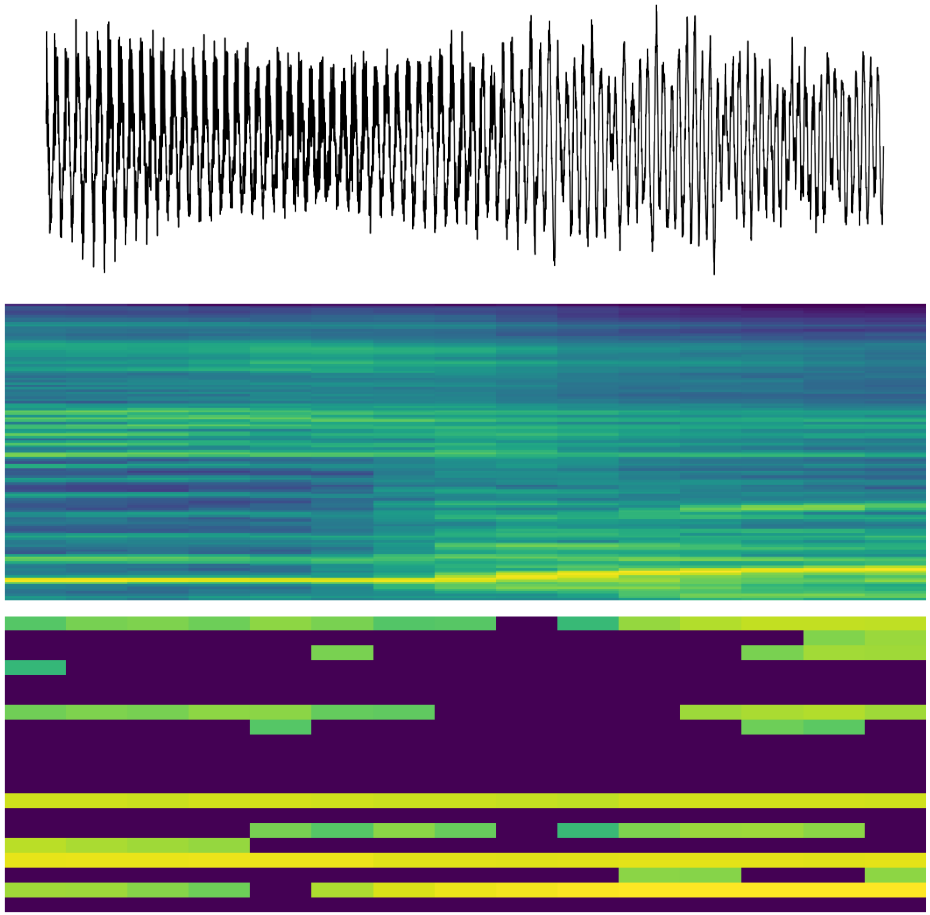
Pipeline



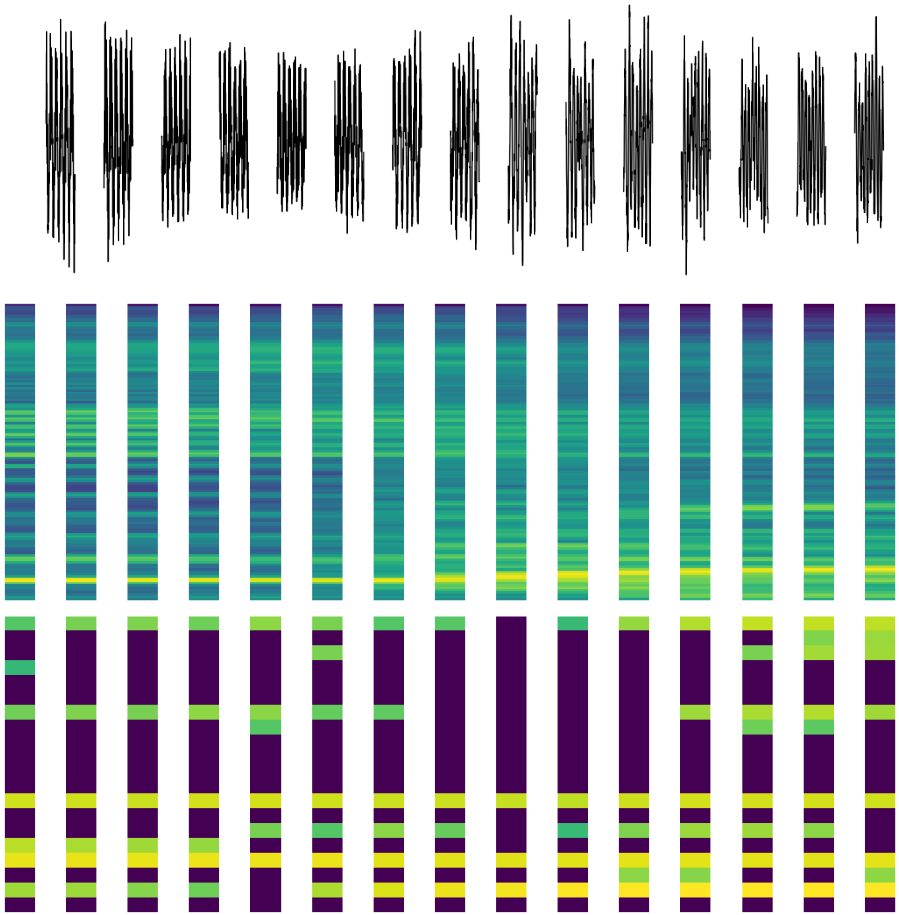
Pipeline

[SV]

Pipeline



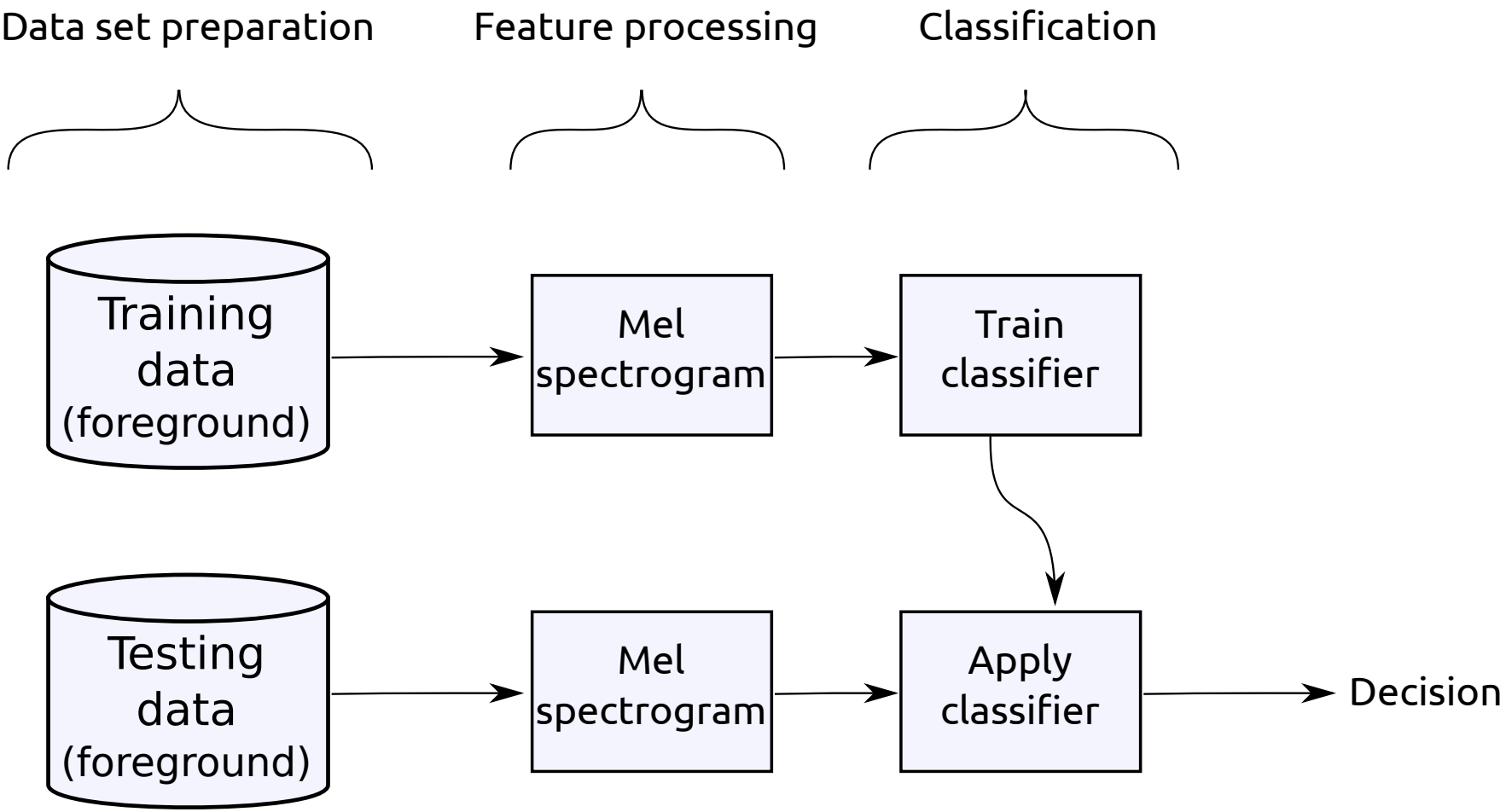
Pipeline



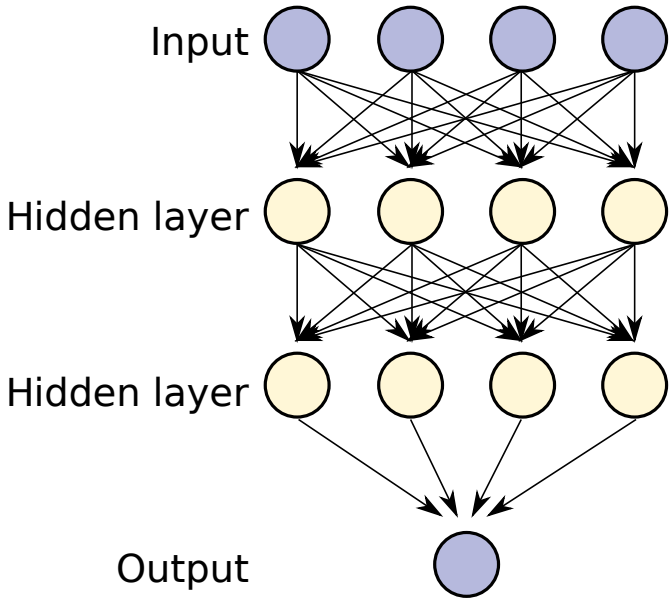
Pipeline

[py]

Pipeline (with machine learning)

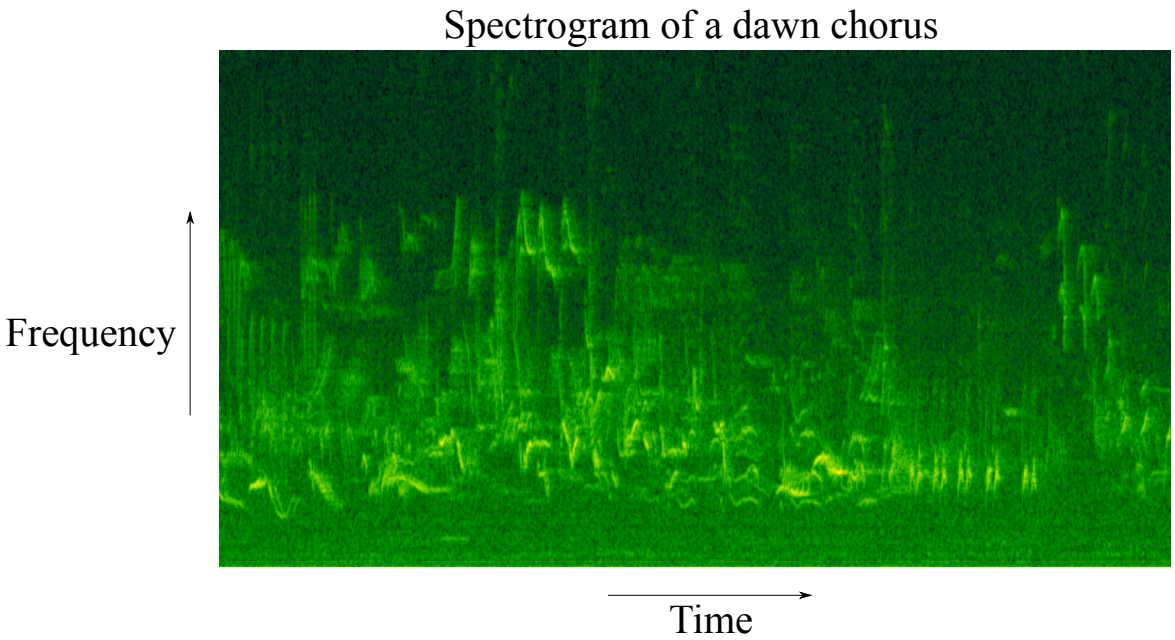


Neural network



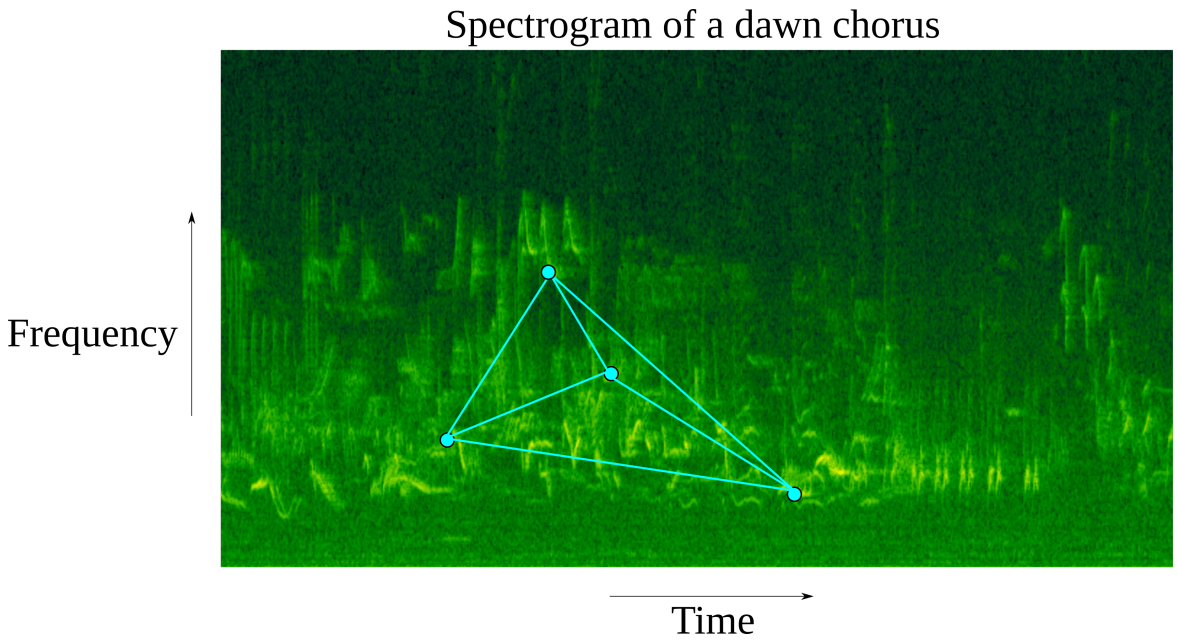
Extras

Analysing sound using machine learning



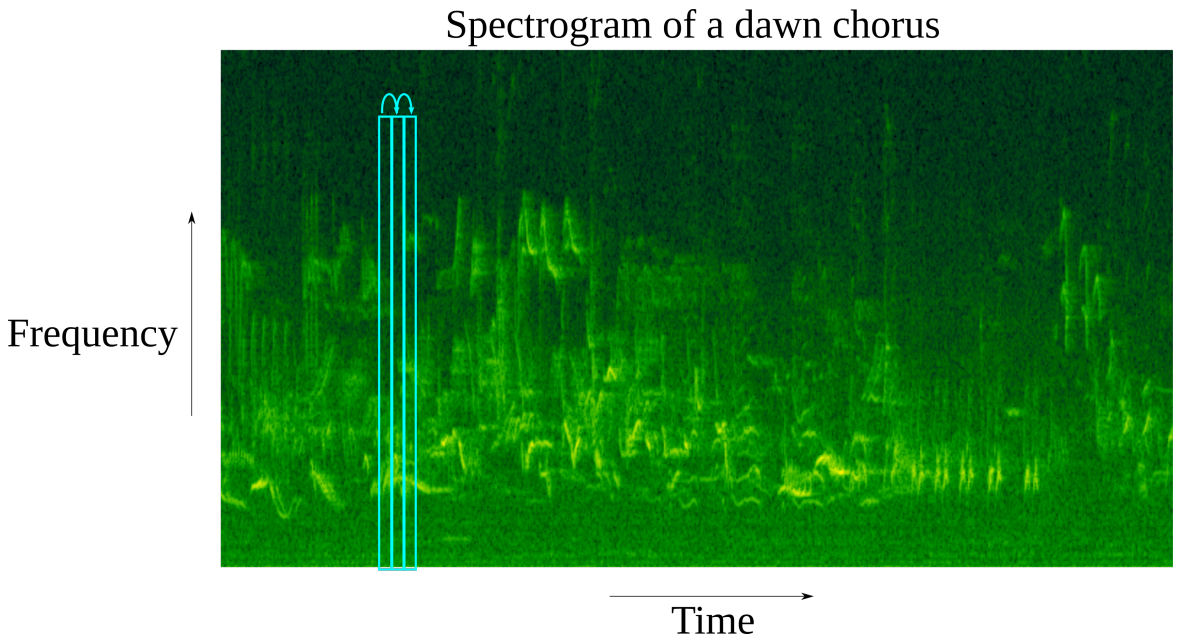
Analysing sound using machine learning

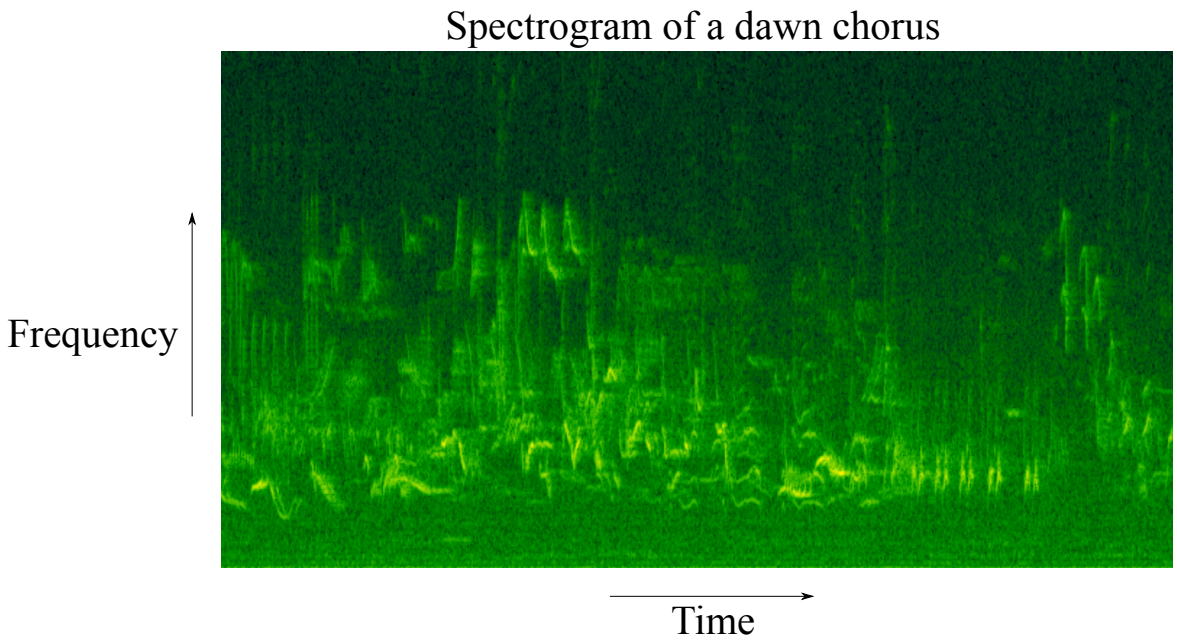
Fingerprinting? ('Shazam')



Analysing sound using machine learning

Speech recognition methods? Hidden Markov model (HMM)



Analysing sound using machine learning

Deep learning?