

AI in Audio

Part I: Automated music generation and production

Spring 2019 - Audio Tech Talk Series

March 3, 2019

What is AI?

Terms

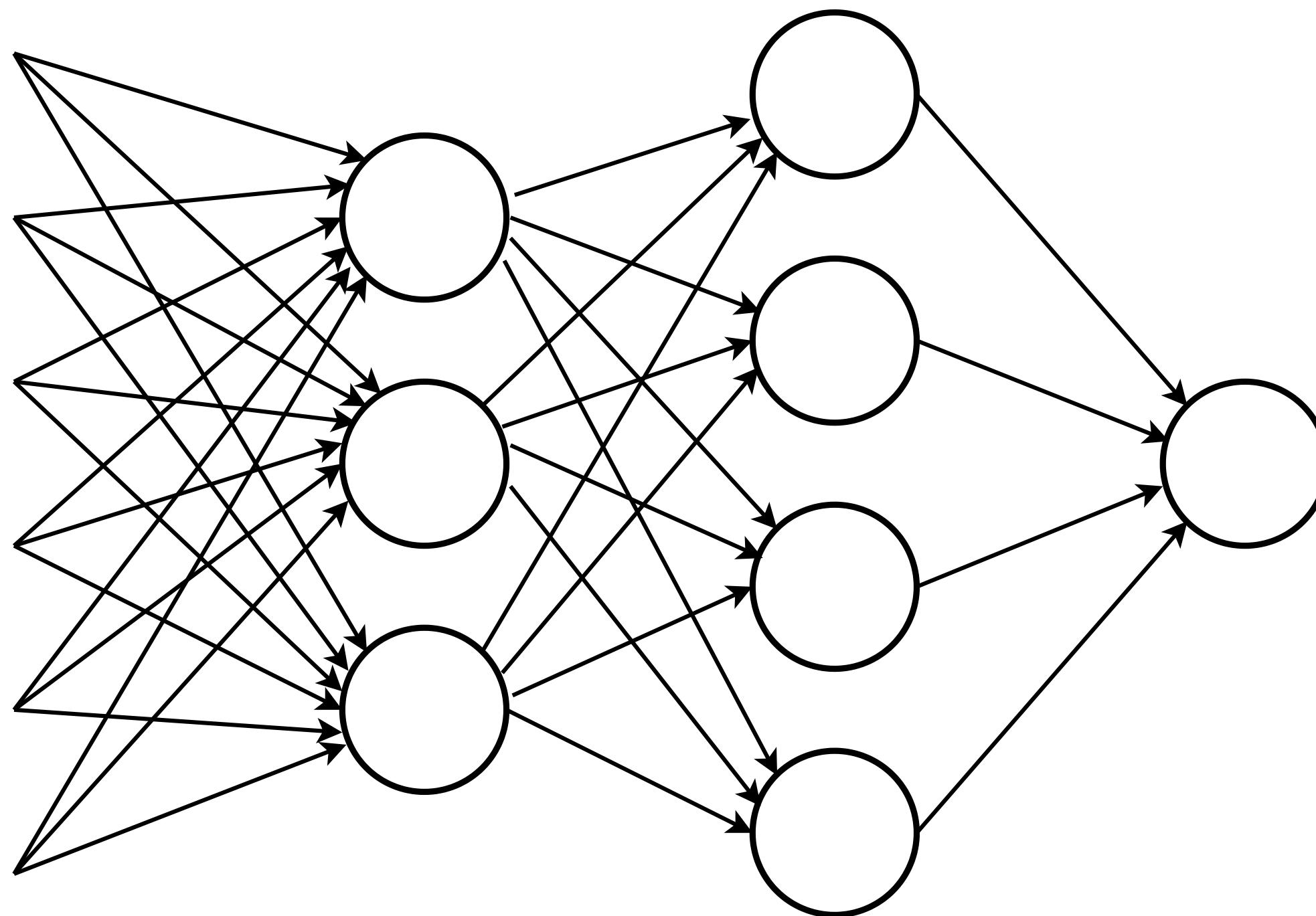
Artificial Intelligence

Machine Learning

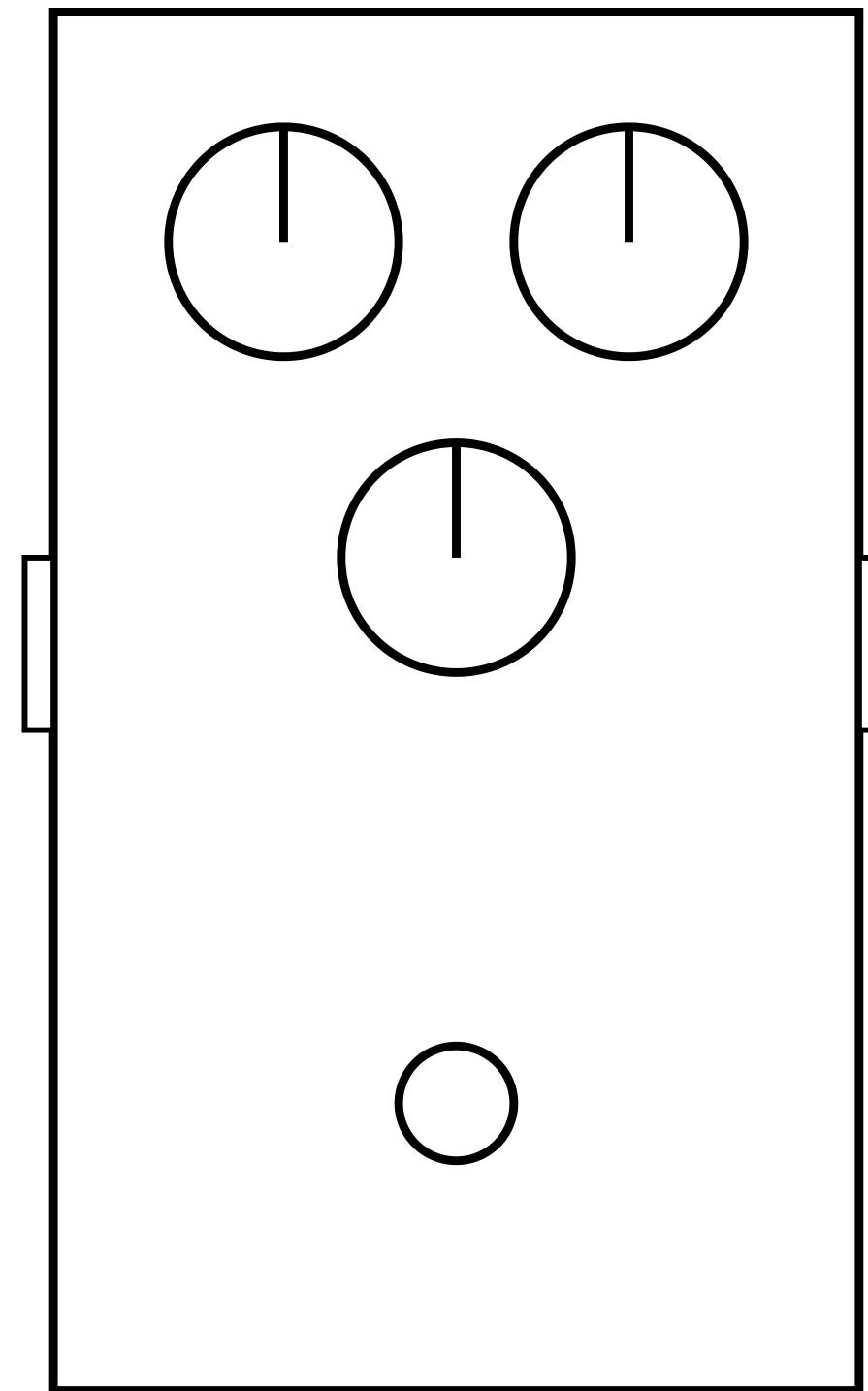
Neural Networks

Deep learning

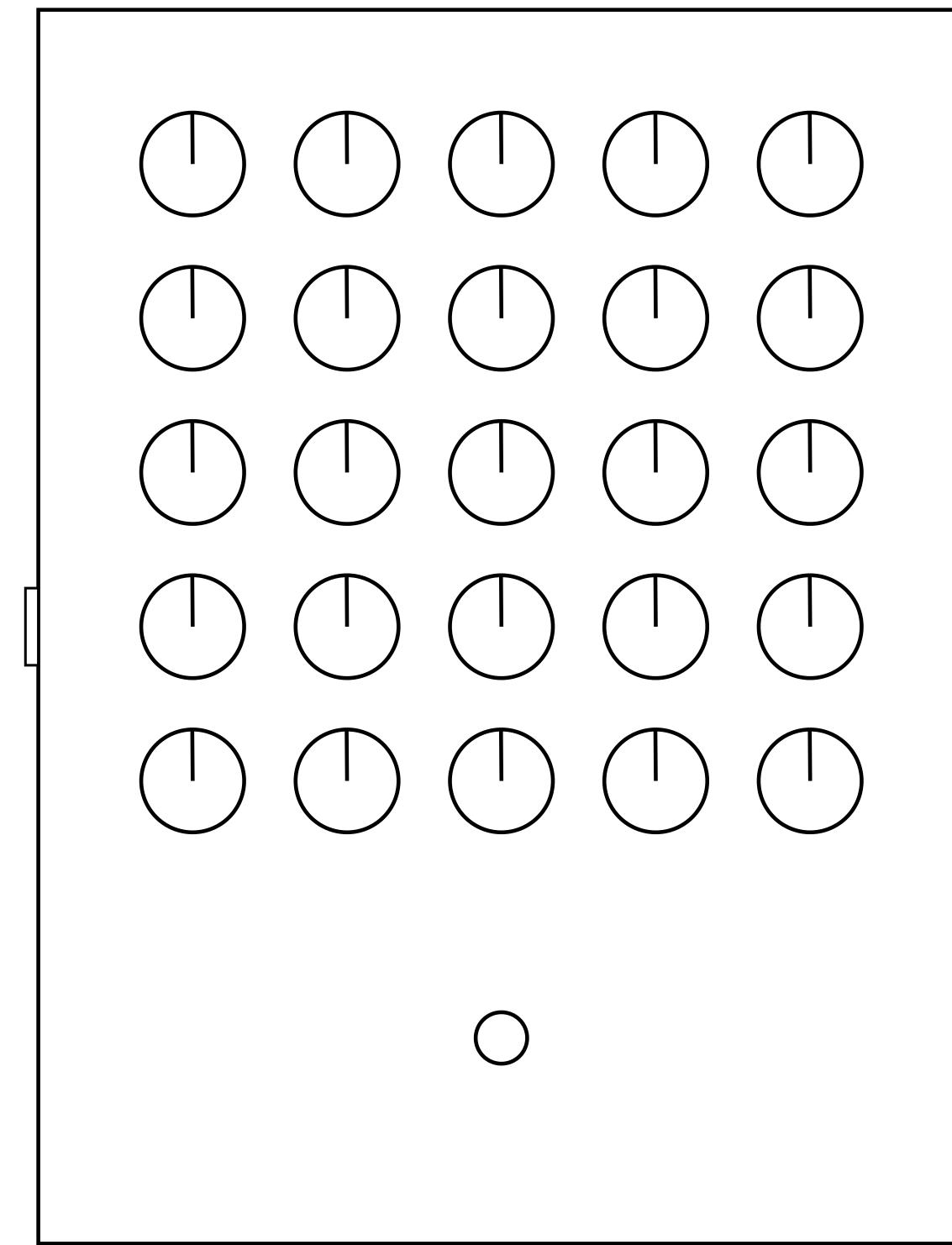
Simple Neural Network



Guitar Pedal



"Neural Network" Guitar Pedal



Examples

YOLO



Progressive growing of GANs



Progressive Growing of GANs for Improved Quality, Stability, and Variation | T. Karras et. al. | 2018

What about music?

We have to go way back...

Wind chimes



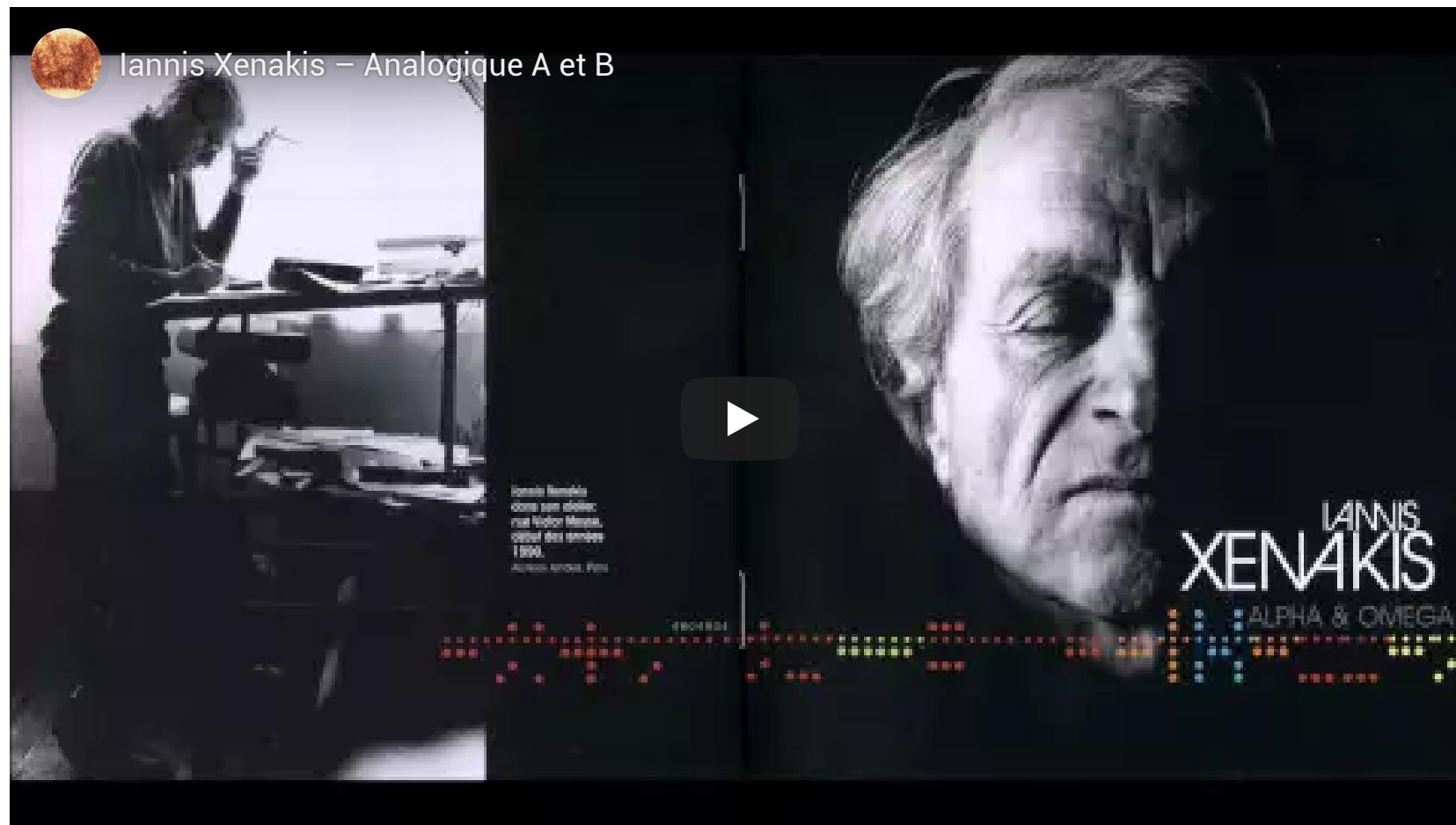
China - 1100 BC

Aeolian harp



Greece - 6 BC

Markov chains



Iannis Xenakis - Analogique in 1920s

Enter deep learning...

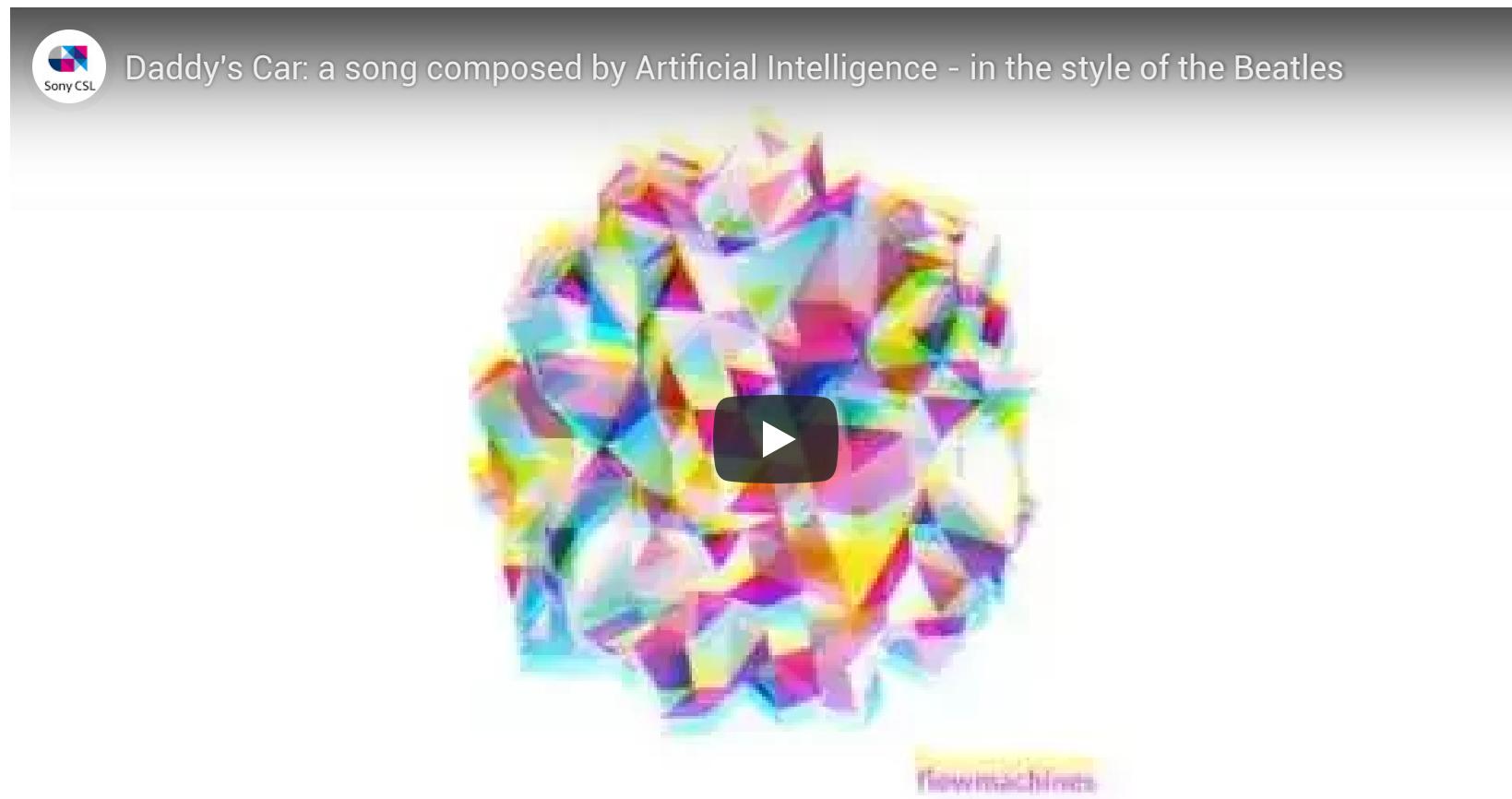
Symbolic music generation with LSTMs

The image displays three staves of musical notation, likely generated by an LSTM model. The top staff starts with a C chord, followed by an F7 chord (indicated in red), another C chord, a Gm7 chord, another C chord, an F7 chord, and a Cdim chord. The middle staff begins at measure 7 with a C chord, followed by Em, A7, Dm7, G7, C, A7, Dm, and G7 chords. The bottom staff starts at measure 13 with a C chord, followed by F7, C, Gm7, C, F7, and Cdim chords. The notation uses a treble clef and includes various note heads and stems.

▶ 0:00 / 5:47 ⏸

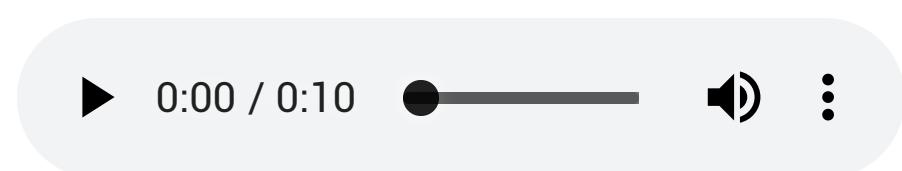
Doug Eck - Blues Improvisation - 2002

Improved symbolic music generation



Sony CSL - In the style of the Beatles - 2016

Raw audio synthesis with WaveNet



Deep mind - Classical piano - 2016

More hybrid and symbolic approaches

Jukedeck



Symbolic + synthesis - 2016

AIVA



In the style Star Wars Theme - 2017

Popgun



Symbolic pop music - 2017

For music production

First automatic mixing system



Dan Dugan - Microphone Mixer - 1975

Grounded theory (Psychoacoustics)



Enrique Perez-Gonzalez - 2009

Knowledge engineering (Mixing rules)



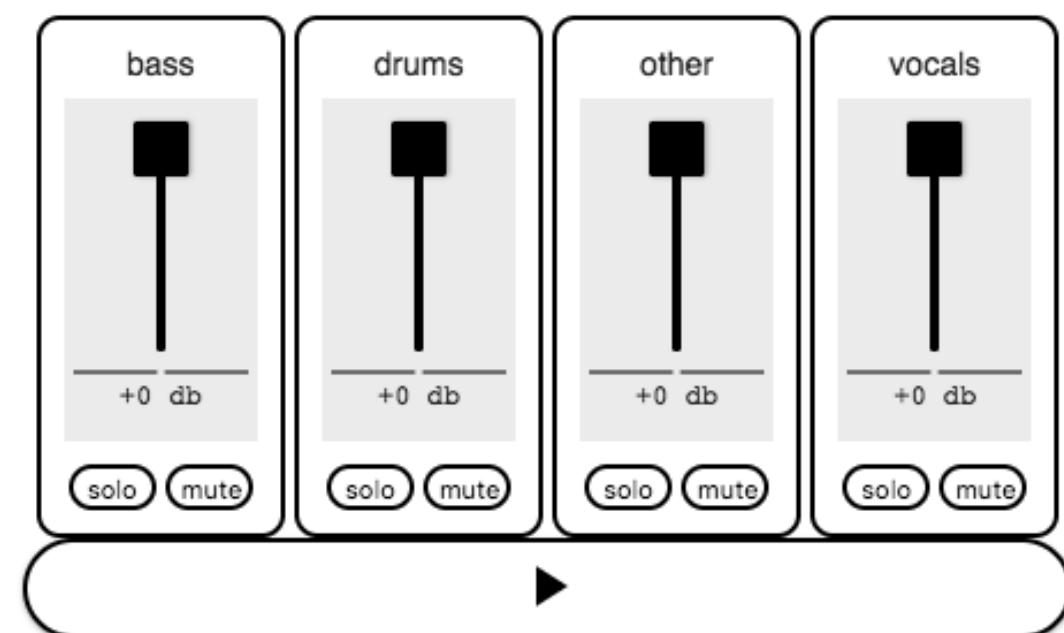
Stuart Mansbridge - 2012

Deep learning is next...

We need more data

5 - Angela Thomas Wade - Milk Cow Blues

[Prev](#) | [Songs](#) | [Next](#)



Save

End-to-end vs. Parameterized models

Next Talk - March 12

AI in Audio

Part 2: Music Recommendation and Understanding