pianissimo

Brittany Bowers

music | generation
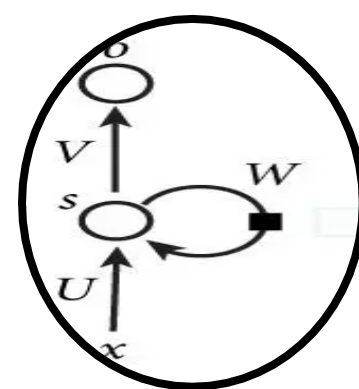
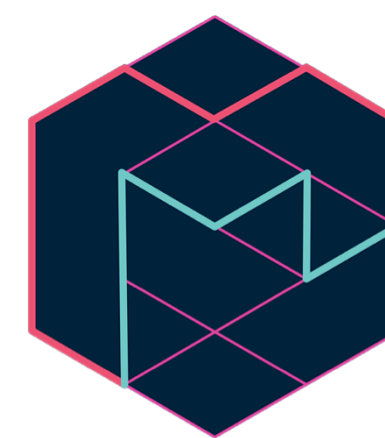## history

1700
musical dice game

1900
markov chains

1989
first RNN

2018
Google launches
Magenta

motivation

what if there was a tool to assist creative inspiration?

ever wonder what a composer could write given infinite time?

goal

use neural nets to generate new songs and patterns from existing composers
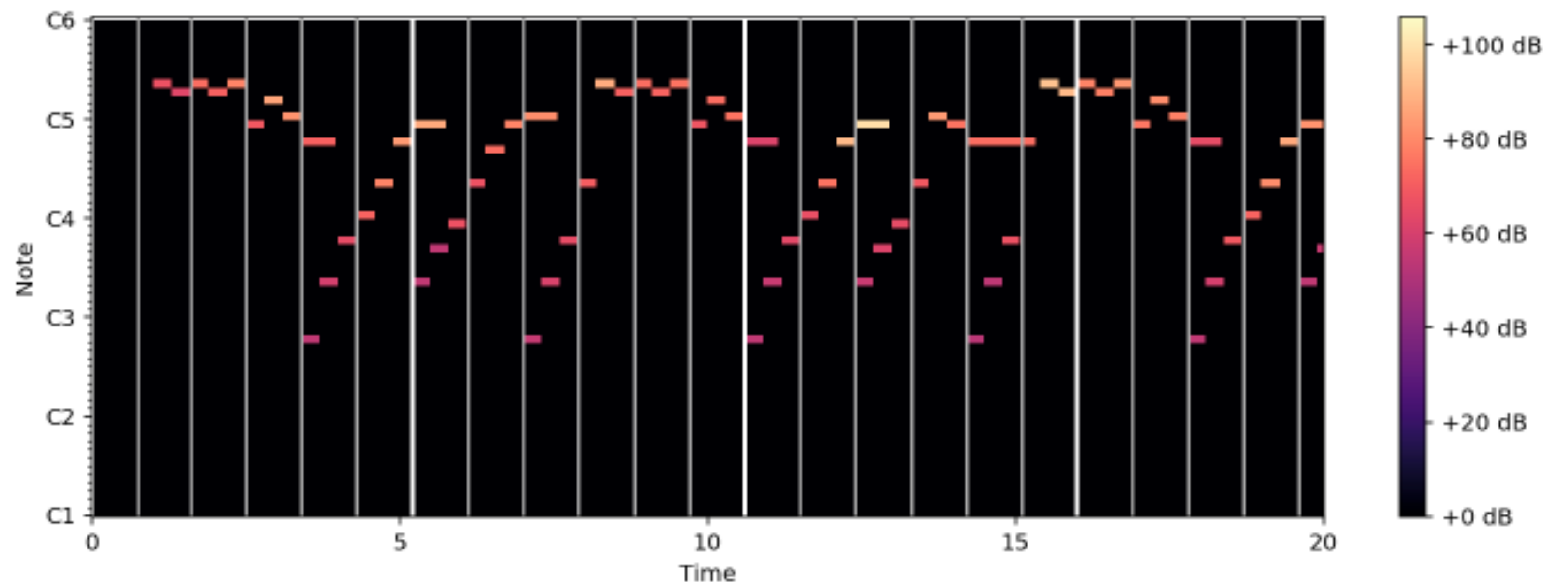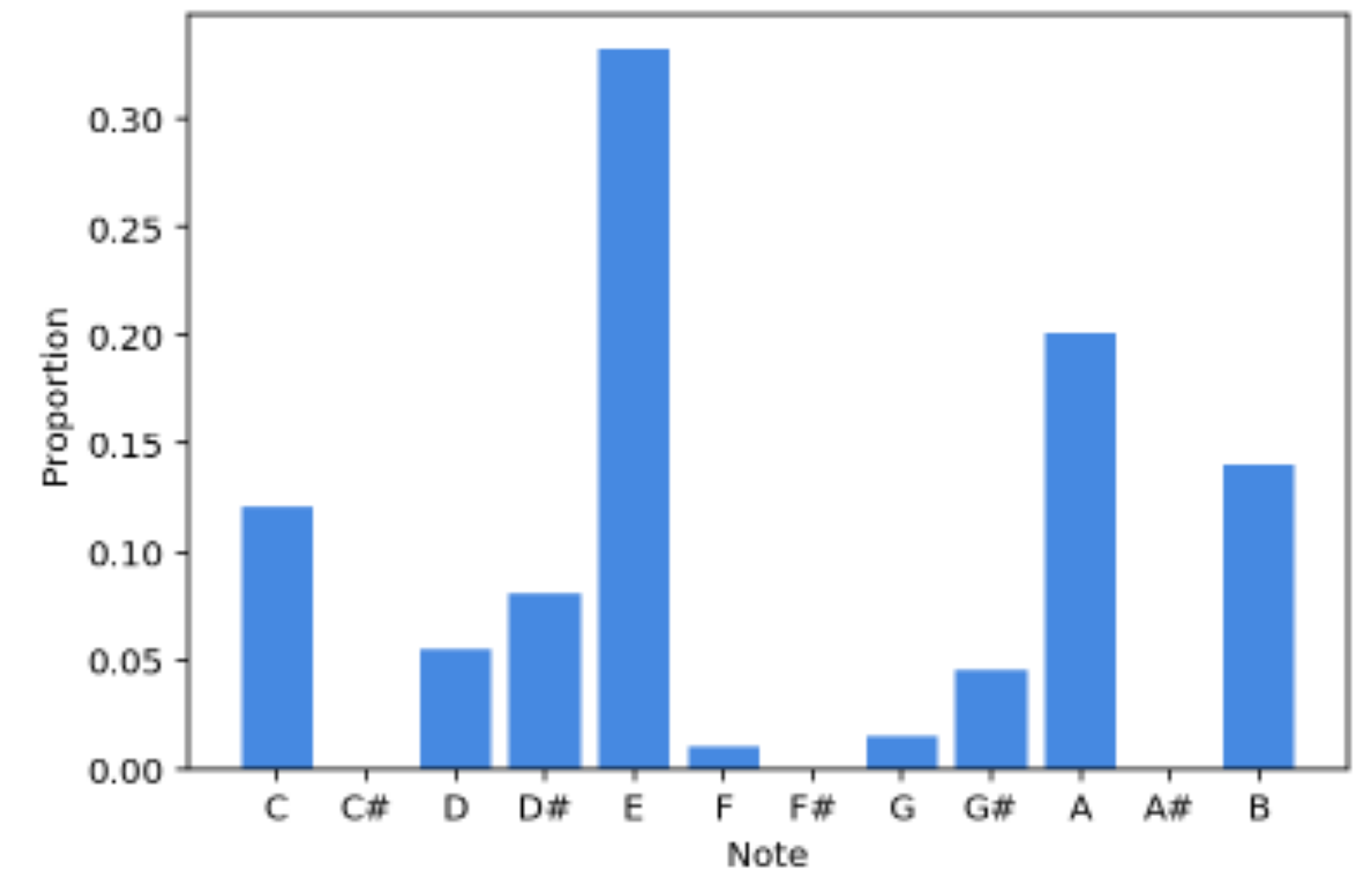and styles using classical music dataset from Magenta

N
E
U
R
A
L

M U S I C A L

visualize | für elise

MIDI Files

Musical Instrument Digital Interface

(i.e. instrument instructions)

- pretty midi
- music21
- librosa
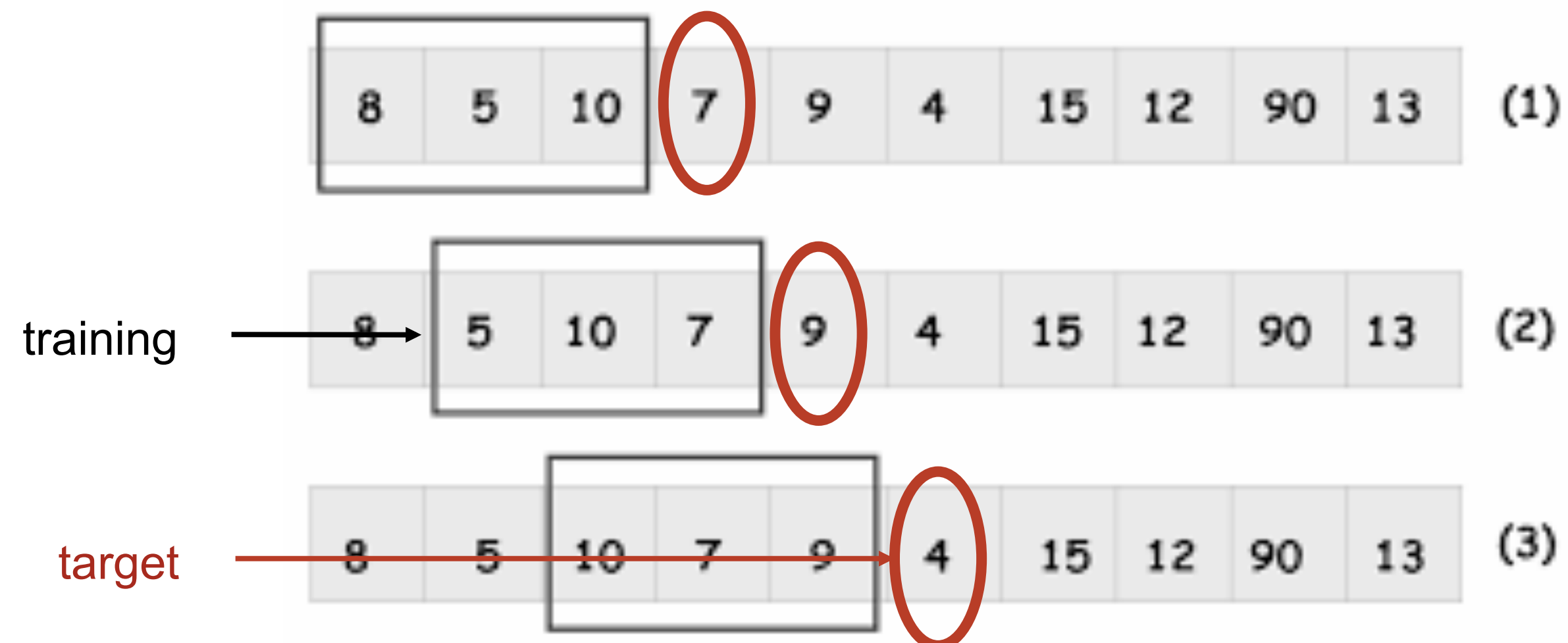- mir eval

neural | inputs

piano roll array

binary array of every time point in the piece by frame

time notes dictionary

convert binary vectors into string of notes at every time point

shifting windows

separate dictionary on increments of 50 and convert to integers representing unique notes
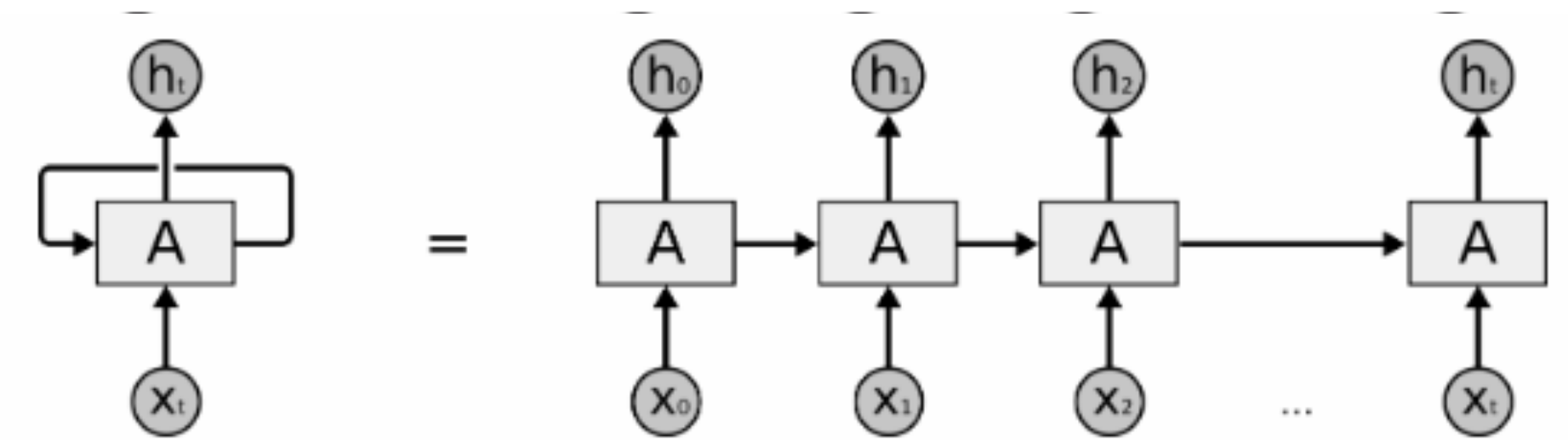or chords

| 8 | 5 | 10 | 7 | 9 | 4 | 15 | 12 | 90 | 13 | (1) |

training →

| 8 | 5 | 10 | 7 | 9 | 4 | 15 | 12 | 90 | 13 | (2) |

target →

| 8 | 5 | 10 | 7 | 9 | 4 | 15 | 12 | 90 | 13 | (3) |

architecture | lstm

recurrent neural net

long-term dependency fails

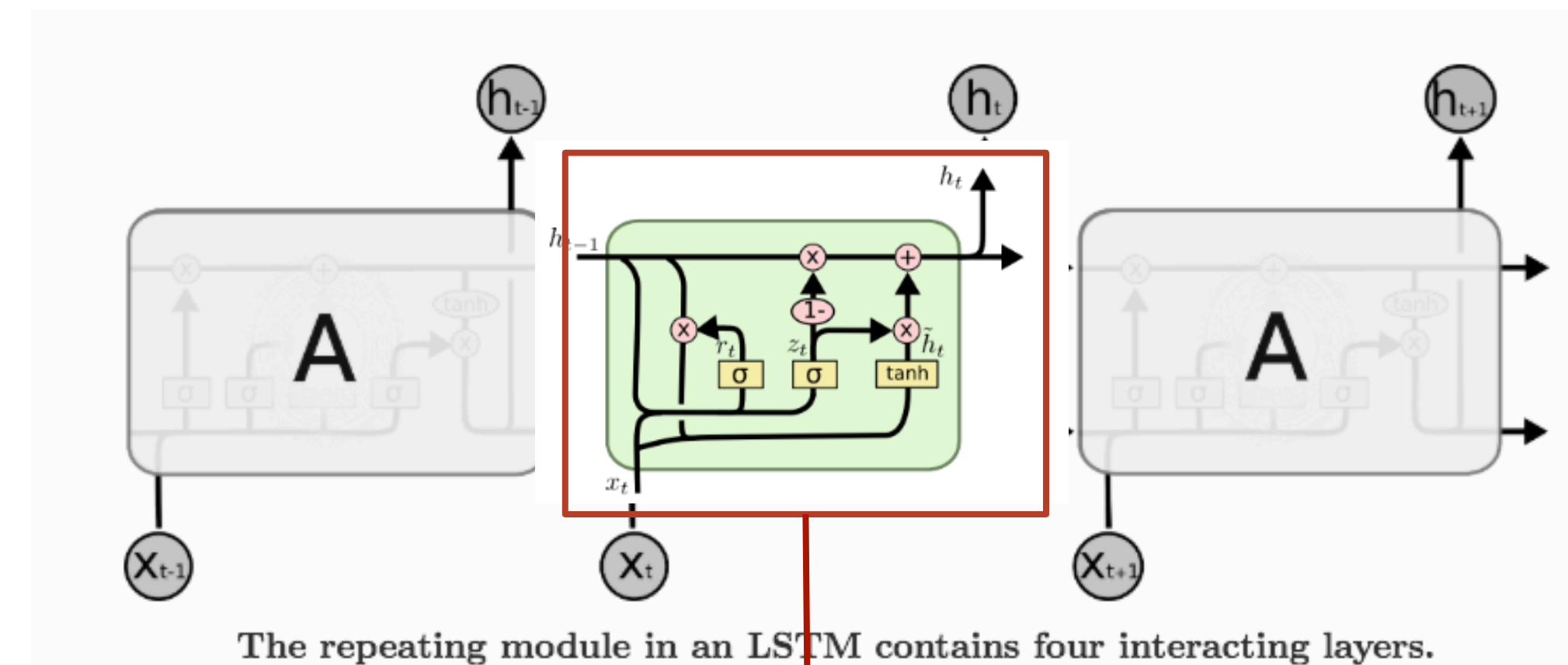when the gaps are too big

An unrolled recurrent neural network.
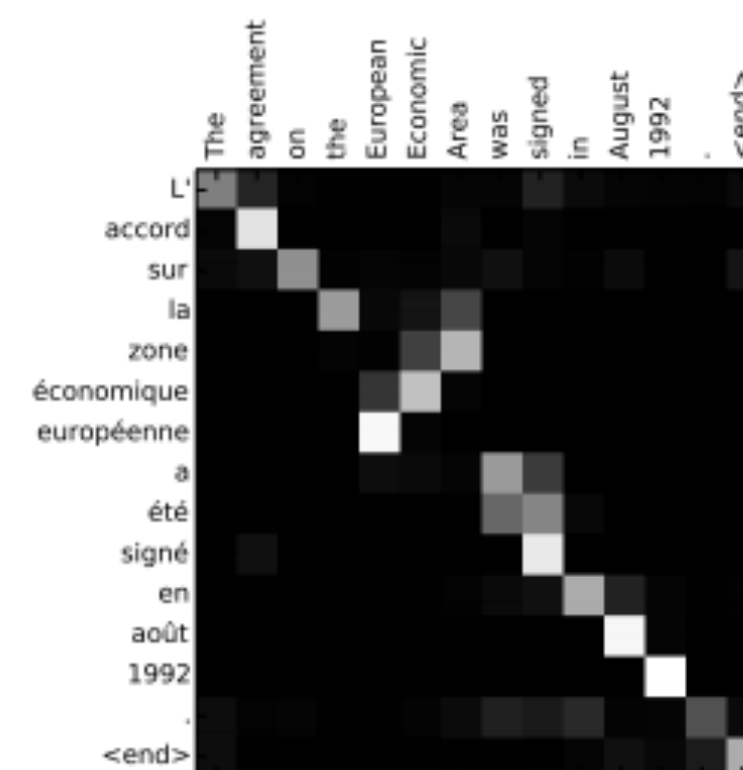
lstm

forget gate

input gate

output gate

The repeating module in an LSTM contains four interacting layers.

gated recurrent unit

self attention

helps the output follow a meaningful path by telling
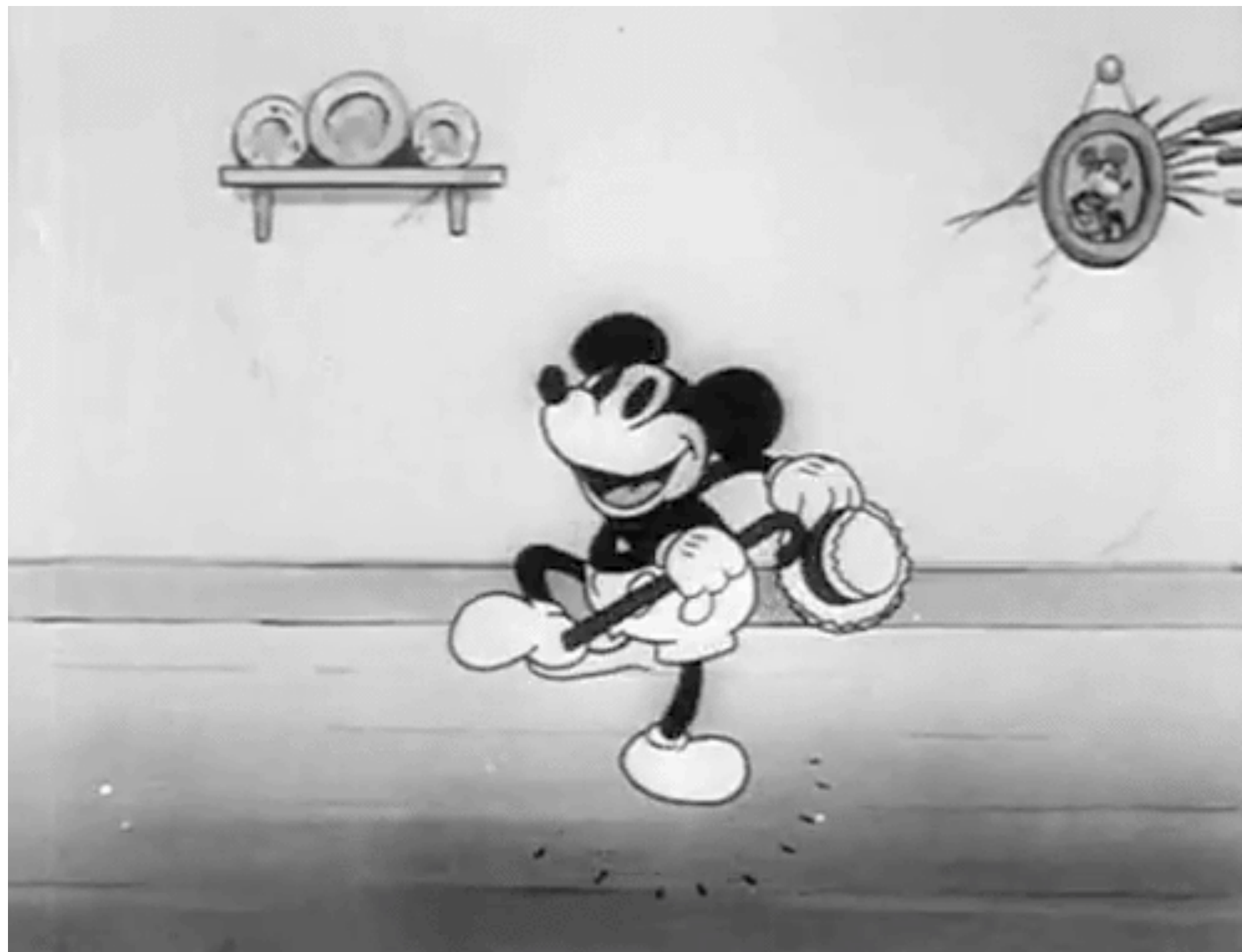
it what to focus on

pi**a**niss**i**mo | performance

Sonata: 100 songs, 5 epochs

🔊

Brahms: 30 songs, self attention, 5 epochs

🔊

Random: 40 songs, self attention, 2 epochs

🔊

Sonata of the Future

any questions?