Generating Music with Neural Networks

A RNN approach

Idea

Network

DUKE VINCENTIO:
Well, your wit is in the care of side and that.

Second Lord:
They would be ruled after this chamber, and
my fair nues begun out of the fact, to be conveyed,
Whose noble souls I'll have the heart of the wars.

Clown:
Come, sir, I will make did behold your worship.

VIOLA:
I'll drink it.

Real Shakespeare

CLAUDIO:
Come, officer, away!

DUKE VINCENTIO:
No, holy father; throw away that thought;
Believe not that the dribbling dart of love
Can pierce a complete bosom. Why I desire thee
To give me secret harbour, hath a purpose
More grave and wrinkled than the aims and ends
Of burning youth.

FRIAR THOMAS:
May your grace speak of it?

In this presentation

- Theory of RNNs
- Pre-processing (several attempts)
- Results (Piano Medley!)

RNN

- Conditional Probability Distribution over known characters
- Given a sequence of input, determine next item in sequence
- "plied Artificial Intelligenc"

RNN

- Feedback
- Output of **t** becomes input in **t+1**
- Tends to forget what happened before sequence
- Long Short-Term Memory Cells

The training data

- Classical Piano music
- MIDI

But how to turn MIDI into text?

Midi to CSV

0, 0, Header, 1, 3, 240
1, 0, Start_track
1, 0, Title_t, "Bach: BWV 772 No-01 2-Part invention"
1, 0, Time_signature, 4, 2, 24, 8
1, 0, Key_signature, 0, "major"
1, 0, Tempo, 666667
2, 0, Start_track
2, 0, Title_t, "Harpsichord RH"
2, 0, Program_c, 0, 6
2, 0, Control_c, 0, 7, 100
2, 0, Control_c, 0, 10, 79
2, 1020, Note_on_c, 0, 60, 97
2, 1075, Note_on_c, 0, 60, 0
2, 1080, Note_on_c, 0, 62, 97
2, 1135, Note_on_c, 0, 62, 0

Data Representation - 1st attempt

25, **1020**, **Note_on_c**, 0, **50**, 97

F2 A7 FF 0D

Data Representation - 2nd attempt

2, **1020**, Note_on_c, 0, **50**, 97

...

2, **1075**, Note_off_c, 0, **50**, 0

F2 A7 3C B1 0D

Data Representation - 3rd attempt

2, **1020**, Note_on_c, 0, **50**, 97

...

2, **1075**, Note_off_c, 0, **50**, 0

F2 A7 3C B1 0D FF

Further improvements

- Encoding Volume
- Encoding Composer
- Larger Network
- More Data

Well… It's not Beethoven

Questions?

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- Andrej Karpathy
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- Beethoven