

Generating music using machine learning

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1. Introduction

1.1 Background

Music is a major content in terms of industry and culture.

- Increased access to music.
- Listen to your favorite music anywhere, anytime.
- All music is digitally archived,
Distributed, searched, shared, created and transmitted.

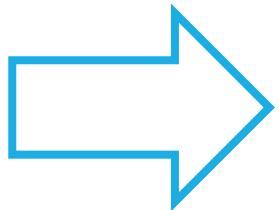
Demand for music analysis, search, and recommendation technology is significant.

1. Introduction

1.1 Background

In recent years, it has become easier for individuals to create, transmit, and share higher quality content.

Demand for music production has also increased.



Using technology to help generating music.

1. Introduction

1.1 Background

Applications of machine learning in music

- **Recognition**

Automatic recognition of musical elements

Genre, tempo, chord progression, etc.

- **Generation**

Composition and performance assistance

Automatic composition and performance expression, etc.

1. Introduction

1.2 Purpose

What is the purpose of using machine learning to generate music?

1. To make it easy for users without composition skills to obtain new music.
2. For composers to explore expressions that are difficult for them.
3. To make it easy for users with composition skills to obtain music that meets the needs of others.

1. Introduction

1.3 Requirement

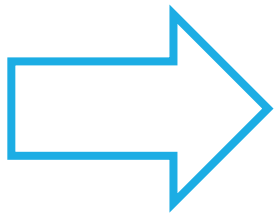
What is required by the purpose?

- A. Ability to create new music.
- B. Follows a musical style familiar to the audience.
- C. Ability to reflect the user's production intentions.

2. Literature review

Fewer data sets, underdeveloped.

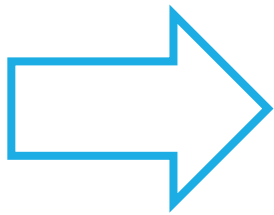
- Compared to image generation models, there are fewer studies of music generation models.
- Many studies focus on classical music, jazz, etc.



Demand for systems to generate music for learning is also likely to increase.

2. Literature review

- Many are extensions of research based on musical notation and music theory.
- Compositional systems that mimic historical composers and artists.



Few studies focus on newness of music.

3. Proposal

The generation of new music and genres is one of the greatest challenges in the field of music and machine learning.

The discovery of newness in music matches my interests and can contribute to the development of the field!

4. Method

4.1 Objective

Object of music generation

- Melody
- Harmony
- Chord Progressions
- Rhythm
- Tone

4. Method

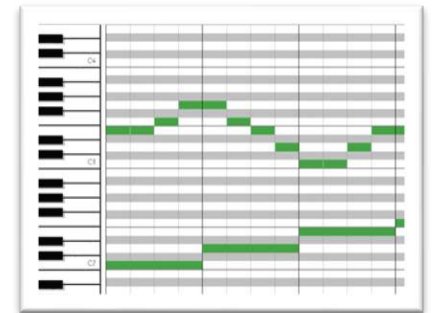
4.2 Representation

Audio signal



Symbolic

- MIDI
- Piano Roll
- Text
- Chord
- Rhythm



4. Method

4.2 Representation

Time representation

- Global
- Time step
- Note step

4. Method

4.3 Input encoding

Two ways to encoding

- Enter as a number
- Enter as one-hot vector

76	0
75	0
	0
64	1
	0
	0
	0
52	0

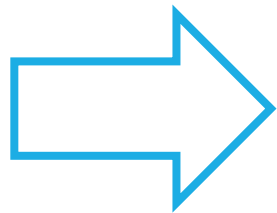
one-hot vector - when representing note number 64 as handling 2 octaves strong from 52-76 in MIDI

4. Method

4.4 Data set

Training Deep Learning models requires large amounts of data.

For copyright reasons, the amount of data is smaller than that of image data, and there is a bias toward genres.



Data set preparation is the difficult tasks.

4. Method

4.5 Architecture

About deep learning models

1. Multilayer Neural Network / Feedforward Neural Network
2. Recurrent Neural Network (RNN)
3. Autoencoder
4. Convolutional Neural Network (CNN)
5. Generative Adversarial Networks (GAN)
6. Reinforcement Learning (RL)

4. Conclusion

The topic I would like to research is automatic composition using machine learning.

Among other things, I am interested in creating new musical expressions and genres.

4. Conclusion

My future tasks are...

- To conduct a thorough survey of previous research to determine the details of my research theme.
- To make a research plan by selecting a method that match my objectives.

References

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