ARTIFICIAL INTELLIGENCE FOR CLASSICAL MUSIC COMPOSITION IN DIFFERENT ERAS
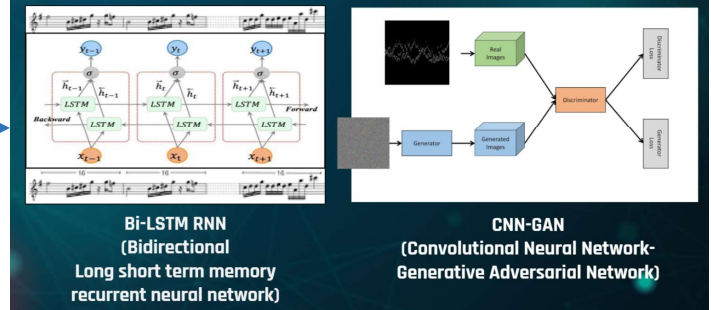
Objective

To generate Classical Music using generative models – Bi-LSTM and CNN-GAN – to compose Classical Music for four Classical Music genres and evaluate their performance respectively and collectively. Also, to further explore the possibility of AI in Classical Music composition.
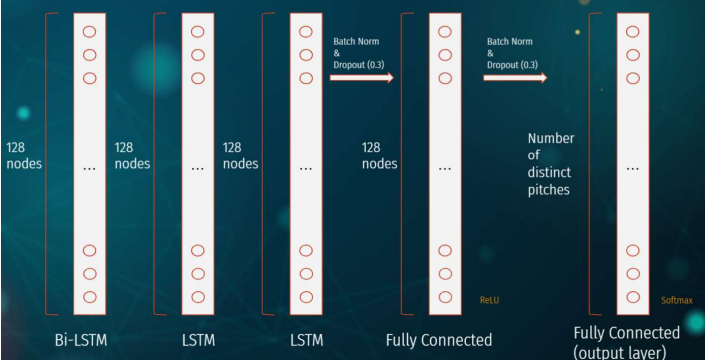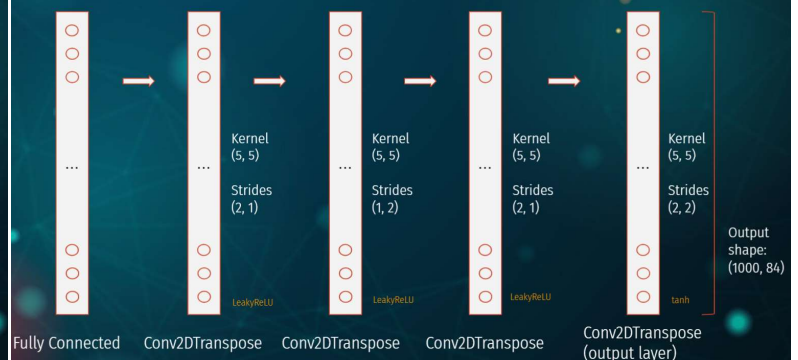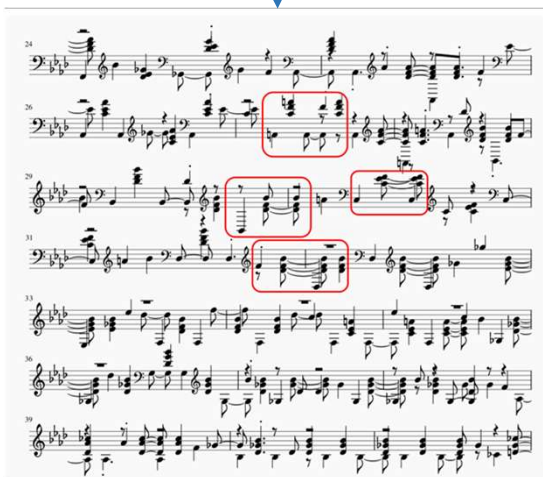
Four periods of musicians

Baroque
- Johann Sebastian Bach
- Antonio Vivaldi
- George Frideric Handel
- Claudio Monteverdi
- ...

Classical
- Joseph Haydn
- Wolfgang Amadeus Mozart
- Ludwig van Beethoven
- Franz Schubert
- ...

Modernist
- Mahler
- Strauss
- Debussy
- ...

Romantic
- Frédéric Chopin
- Clara Schumann
- Robert Schumann
- Felix Mendelssohn
- ...

2 Models

Bi-LSTM RNN (Bidirectional Long short term memory recurrent neural network)

CNN-GAN (Convolutional Neural Network-Generative Adversarial Network)

Bi-LSTM - structure

| 128 nodes | ... | 128 nodes | ... | 128 nodes | ... | Batch Norm & Dropout (0.3) | 128 nodes | ... | Batch Norm & Dropout (0.3) | Number of distinct pitches | ... |

ReLU | Softmax

Bi-LSTM | LSTM | LSTM | Fully Connected | Fully Connected (output layer)

Generator structure (CNN)

Kernel (5, 5) Strides (2, 1) LeakyReLU | Kernel (5, 5) Strides (1, 2) LeakyReLU | Kernel (5, 5) Strides (2, 1) LeakyReLU | Kernel (5, 5) Strides (2, 2) tanh

Output shape: (1000, 84)

Fully Connected | Conv2DTranspose | Conv2DTranspose | Conv2DTranspose | Conv2DTranspose (output layer)

Generated Results

Conclusion

- Notes and melodies are more predictable but less creative in horizontal perspective
- Easier to train and evaluate the model
- Suitable musical eras: Baroque, Classical, and some Romantic eras

- High uncertainty of notes and melodies
- Demonstrates valid musical structures in vertical perspective
- More difficult to train and evaluate the model
- Suitable musical eras: Modernist and Romantic eras

Final Year Project by Jonathan Chia-Tse, Kuo

CityU Department of Computer Science City University of Hong Kong