Music Generation using LSTM

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Goal

To create melodious music from Scratch, or from partially pre-defined music notes, without any previous skills in music.

Dataset

Midi (Musical Instrument Digital Interface) is a standard protocol for interchange of musical information, they are composed of 'Notes' and 'Chords'. They also give the information about what note to be played, when they are played, how long they are played and at what pitch the note is being played and so on.

Alternative Approach

Creating music is an ART, the creation of music using own skill can consume lot of time and even then the results may be not as expected.
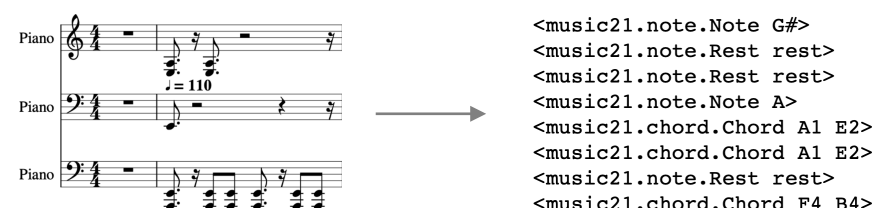
Challenges

Many challenges we faced during the project. Some of them are
1. Computationally intensive
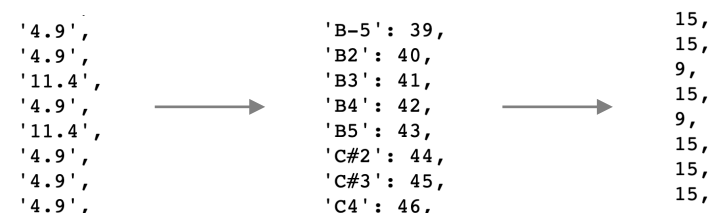2. Dealing with different musical instruments in dataset.

Approach

Model can generate music from scratch

Step I   : Input music files

```
<music21.note.Note G#>
<music21.note.Rest rest>
<music21.note.Rest rest>
<music21.note.Note A>
<music21.chord.Chord A1 E2>
<music21.chord.Chord A1 E2>
<music21.note.Rest rest>
<music21.chord.Chord F4 B4>
```
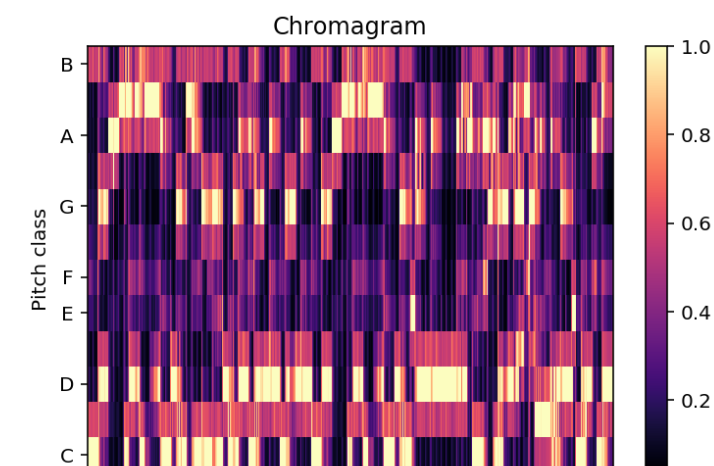
Step II : Encoded music file into notes

```
'4.9',        'B-5': 39,       15,
'4.9',        'B2': 40,        15,
'11.4',       'B3': 41,        9,
'4.9',        'B4': 42,        15,
'11.4',       'B5': 43,        9,
'4.9',        'C#2': 44,       15,
'4.9',        'C#3': 45,       15,
'4.9',        'C4': 46,        15,
```

Step III : Trained model with generated notes

```
Layer (type)              Output Shape        Param #
====================================================
lstm_1 (LSTM)             (None, 100, 512)    1052672

dropout_1 (Dropout)       (None, 100, 512)    0

lstm_2 (LSTM)             (None, 100, 512)    2099200

dropout_2 (Dropout)       (None, 100, 512)    0

lstm_3 (LSTM)             (None, 512)         2099200

dense_1 (Dense)           (None, 256)         131328

dropout_3 (Dropout)       (None, 256)         0

dense_2 (Dense)           (None, 358)         92006

activation_1 (Activation) (None, 358)         0
====================================================
Total params: 5,474,406
Trainable params: 5,474,406
Non-trainable params: 0
```

Step IV : Generate music with trained model

Visualising output

Above fig is a visual representation of notes of the music generated from the trained model.

Results

This approach can create melodious music, from scratch or from partially - pre defined notes.

References

https://web.mit.edu/music21/doc/

https://keras.io/layers/recurrent/

https://towardsdatascience.com/how-to-generate-music-using-a-lstm-neural-network-in-keras-68786834d4c5

https://medium.com/datadriveninvestor/music-generation-using-deep-learning-85010fb982e2

https://librosa.github.io/librosa/generated/librosa.display.specshow.html