MAIS Preliminary Report: AI-composed music

Nicholas Connors

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1 Problem Statement

Original goal was to compose jazz music with an LSTM. Data set was changed to classical music as it was more available. Might use multiple datasets in the future, in order to create music of different genres.

2 Dataset

MIDI data was retrieved from http://www.piano-midi.de/

Website has 100s of classical music MIDI files. Data pre-processing simplifies MIDI files down to an array of notes played represented as integers from 0-127 (range of MIDI notes) with 128 representing a timestep. A downside of this approach is that the tempo of the piece is not accounted for during training. Notes on the higher and lower ends of the range were unused allowing the number of notes to be shortened to 103.

3 Machine learning model

An LSTM model was used. When given a series of notes it will predict which notes come next, allowing it to generate music of any length.

Current model is a sequential model with two layers of 256 LSTM neurons each, then a dense layer of 103 neurons (number of notes). The softmax activation function was used. The Keras library was used to implement it.

4 Preliminary results

Preprocessing works, script to turn an array of ints into a midi file works. Examples of this are random1.mid and random2.mid which contain "songs" made using random number generation.

Given a small amount of training time (1 hour) the neural network was unable to output anything interesting. The note prediction were just 128 indefinitely effectively creating a song that is just rests.

Even though I don't have proper results from the neural network yet, I expect this project to be feasible. Converting the midi files into training data was the largest hurdle, all that is needed now is time to train the network.

5 Next steps

Properly training the model, and fine-tuning as necessary. Potentially expanding the dataset to include other genres of music.

6 References

Tutorials and repositories used for reference:

- https://adventuresinmachinelearning.com/keras-lstm-tutorial/
- https://machinelearningmastery.com/text-generation-lstm-recurrent-neural-networks-python-keras/
- http://warmspringwinds.github.io/pytorch/rnns/2018/01/27/learning-to-generate-lyrics-and-music-with-recurrent-neural-networks/
- https://github.com/jisungk/deepjazz

MIDI to csv converter from: http://www.fourmilab.ch/webtools/midicsv/