Emotional Music Generation

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Problem Definition

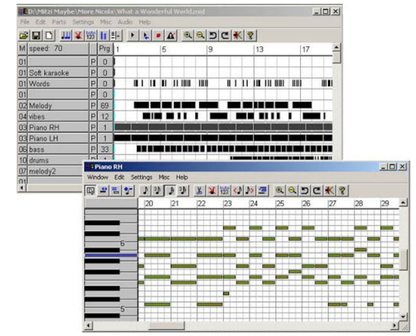
We seek to implement a recurrent neural net using the LSTM architecture to generate music chords & notes from a user-selected emotional category.

Overview

- Music generation using neural nets has been around since 1989
- Deep neural networks have the ability to “learn” from big data sets
- Long short-term recurrent neural networks are useful for making predictions based on previous data, making them useful for generating new music based from a database of predetermined songs.
- Our goal is to generate new music based on an emotion

Methods

- Upload MIDI sequence files based on each emotion tag
- Implement LSTM recurrent neural network to train model with labeled MIDI sequence data
- Test accuracy at which music generated can match emotion tag input



Metrics

Given MIDI notes $X_t, X_{t-1}, \ldots X_0$ representing vectors at time intervals t, t-1, … 0, generate vector X_{t+1} at interval t + 1.

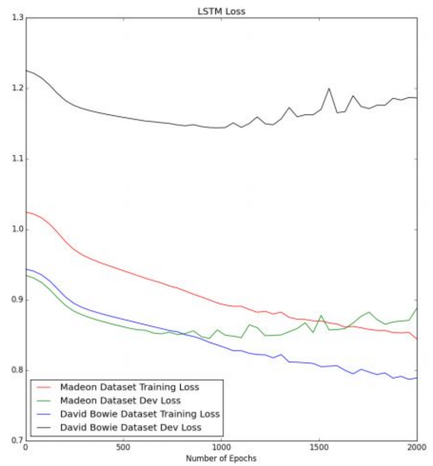
As this problem seeks to predict the t + 1 vector using previous data, it can be classified as a regression problem.

Our L2 loss function is represented using the equation, also referred to as the least squared error formula:

$$l(\theta) \equiv \frac{1}{T}\sum_{t}(X_t - \hat{X}_t)^2$$

Evaluation

As discussed in the metrics section, the goal will be to minimize the loss function. This will be represented graphically, as shown below:



Conclusion

The following are conclusions we seek to arrive at after the implementation of the RNN:

- Teach music chord progressions & patterns that indicate specific emotions
- Create a model capable of generating music catered to a given emotion
- Create a model capable of generating music that is aesthetically pleasing