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.

Metrics

- Our SVR classifier has changed since touchpoint 2. Instead of making a regression to classify valence and arousal, we instead use a binary classifier. The new metrics for this classifier are precision, recall, and F1 score.

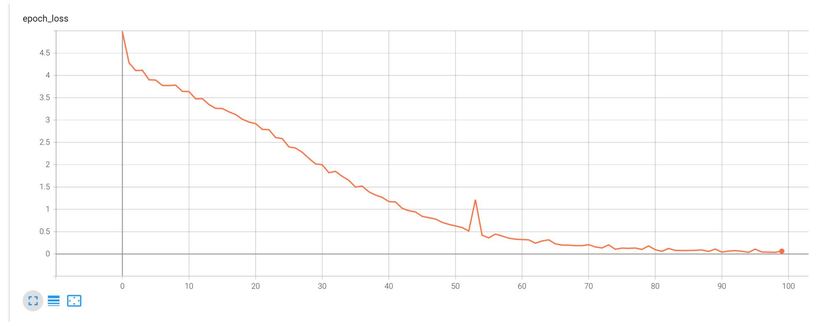
$$precision = \frac{TP}{TP + FP}$$

$$recall = \frac{TP}{TP + FN}$$

$$F1 = \frac{2 \times precision \times recall}{precision + recall}$$

- The LSTM part of this problem will involve running 200 epochs to generate new music.

Results



The graph above shows the reduction in training loss after the neural network was trained on 3 midi files over 100 epochs.

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

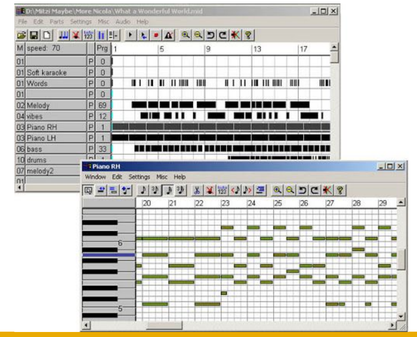
Results

	Valence	Arousal
Precision	0.7	0.81
Recall	0.87	0.76
F1-score	0.77	0.78

- The vgmidi data set that our SVM classifier uses has a JSON file with each musical piece broken down into components
- Simple classification of the valence and arousal for these pieces were conducted to see the predicted v. received values

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 using precision, recall, and the F1 score at which music generated can match emotion tag input



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