Generating music with LSTM

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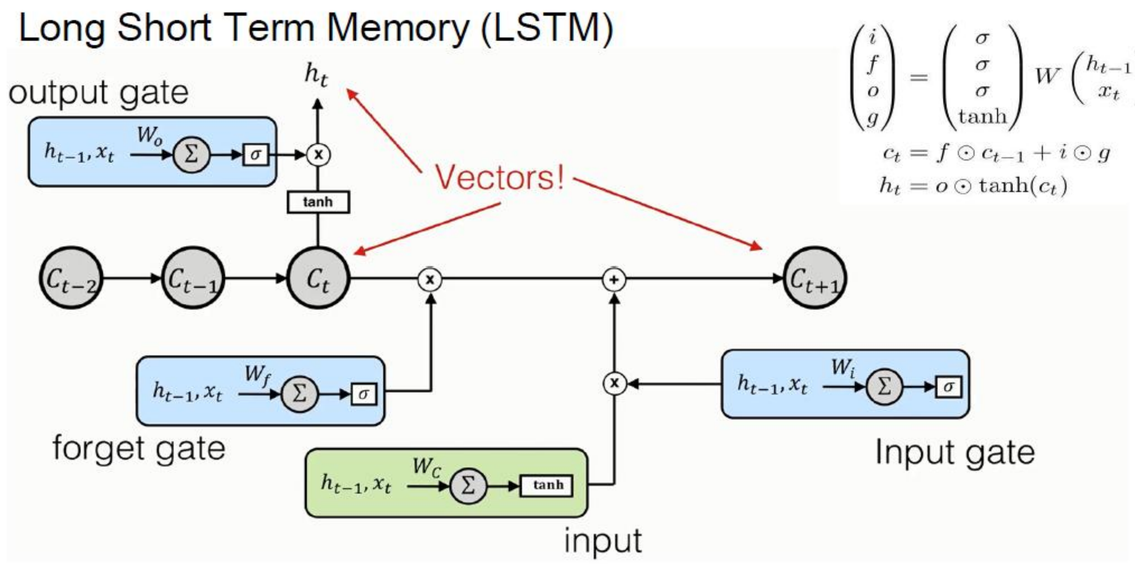
Abstract

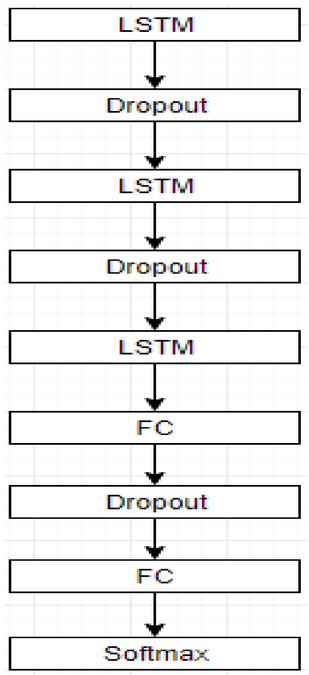
LSTM networks are a type of recurrent neural networks that uses special units in addition to standard units. *LSTM* units include a 'memory cell' that can maintain information in memory for long periods of time. A set of gates is used to control when information enters the memory, when it's output, and when it's forgotten. This architecture lets them learn longer-term dependencies.

Introduction

In this project we used *LSTM* in order to train network to generate music. Training set consists of sequences of notes/chords and as a result network predicts 500 notes/chords, based on the randomly selected sequence of notes/chords from the training set.

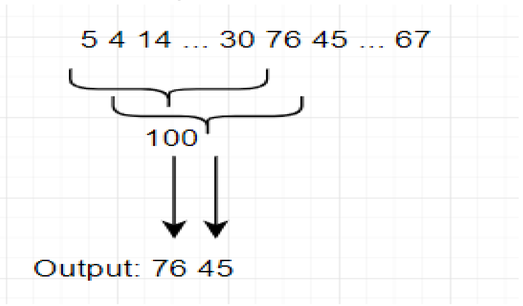


Model architecture

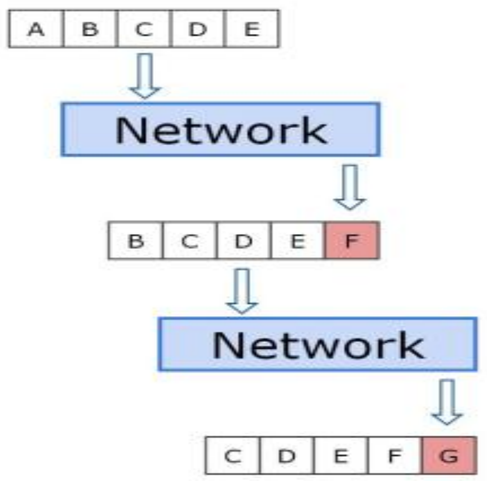


Generation pipeline

1. Remove drum parts from *MIDI* file
2. Extract instrument part based upon sorted list of most frequent instruments
3. Extract notes and chords from instrument part
4. Map notes and chords to numbers
5. Create input for *LSTM* as shown on the example below

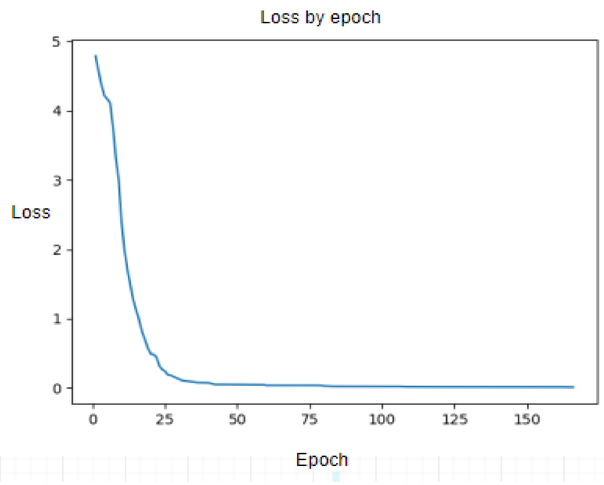


6. Train network
7. Sample outputs



Results

After 200 epochs of training we have achieved 0.0127 value for categorical crossentropy loss.



Conclusion

Using *LSTM* neural network proved to be a simple, yet a good method for generating music beside some limitations. Even with only 9 layers and single instrument, results are decent. You can check them at: https://github.com/ori-2019-siit/AIMusicGenerator/tree/master/generated_music