

Drum detection in audio files using recurrent neural network

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Introduction

This poster summarizes attempt to make software for transcribing percussion instruments and drums in audio files. We think that this kind of software would help people who write sheet music and people who are learning to play drums.

Data

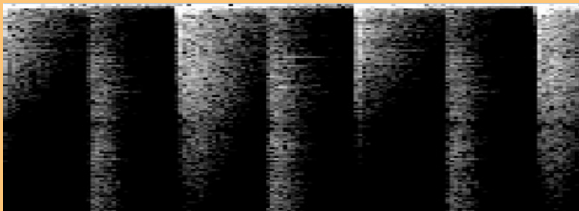
We have created our dataset using TuxGuitar tablature editor and Hydrogen drum machine. TuxGuitar is used for creating drum patterns and midi files. Hydrogen is used for creating audio files out of midi files.

Results and Summary

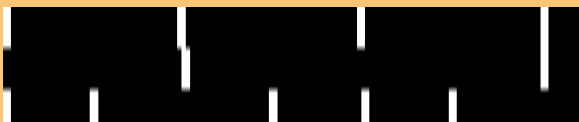
Unfortunately, results did not turn out the way we planned. Problem we faced was slow training of neural network caused by our old hardware. We have tried to reduce dataset and/or change neural network configuration but that did not help us to get better results.

Algorithm

To be able to train and run neural network, first thing we need to do is transform our dataset into matrices. Audio files were transformed using short-time Fourier transformation. Rows in audio matrix represent frequency values from 20 Hz to 20 kHz. Columns represent time intervals. Values in matrix represent amplitudes. Rows in midi matrix represent kick drum, snare drum and hihat, respectively. Columns represent time intervals. Columns in audio and midi matrices must represent the same time interval.



Audio matrix



Midi matrix

We have used recurrent neural network with 3 layers. Input and middle layer each have 4 neurons. Output layer has 3 neurons.

We have evaluated neural network performance by comparing given and calculated matrices.

Evaluation function tells us how many fields in calculated matrix differs from given matrix in percentage.

References

- [1] - Recurrent Neural Networks for Drum Transcription
Richard Vogl, Matthias Dorfer, Peter Knees
http://www.cp.jku.at/research/papers/Vogl_etal_ISMIR_2016.pdf
- [2] - The Unreasonable Effectiveness of Recurrent Neural Networks
Andrej Karpathy
<http://karpathy.github.io/2015/05/21/rnn-effectiveness/>