

AN AUDIO KEY FINDING ALGORITHM

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ABSTRACT

The audio key finding algorithm detects the first key established in a music audio of 30 seconds. The algorithm first detects the note onsets in the signal based on changes of signal energy and pitch content. The signal in each inter onset window is transformed to power spectrum using Const-Q transform. Then the pitch content of each window is classified to mono, chord, or other pitch set and the relevant pitch classes are determined. The key of the music is claimed based on the accumulated evidence of a certain key using a set of rules, which are derived from the training data.

Keywords: Audio Key Finding

1 THE ALGORITHM

This audio key finding algorithm takes the following steps of processing:

In step 1, the time of onsets of music notes are detected from the audio signal. Both signal energy and pitch content are utilized in detecting note onsets. Very short inter note onset intervals are eliminated from the detection result. The processing is based on short window DFT.

In step 2, Constant Q Transform [1] is performance for each detected note onset. The transform computes 24 components per octave and 7 octaves from pitch $A=27.5\text{Hz}$.

In step 3, based on the CQT power spectrum, the pitch content of each note onset window is classified to mono, chord and other pitch sets and the relevant pitch classes are determined.

In step 4, cues of certain key are extracted from the signal: such as tonic note, tonic chord, diatonic pitch set, and etc. And the first key is claimed based on the accumulated evidence using a set of rules.

The rules are derived from music knowledge and the parameters are learned from the MIDI training data.

Details of the rules derived for key detection will be presented in the final draft.

2 THE IMPLEMENTATION

On an Intel 1.66GHz Windows PC, it takes 40 seconds for the processing of a 30-second-long music clip.

REFERENCES

- [1] BROWN J.C. Calculation of a constant Q spectral transform. In *J. Acoust. Soc. Am.*, 89(1):425-434, 1991A