MIREX SUBMISSIONS FOR CHORD RECOGNITION 2016

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ABSTRACT

This abstract describes our chord recognition submissions for MIREX 2016. Implementations for the algorithms are part of the *madmom* audio processing framework [1] available at https://github.com/CPJKU/madmom.

1. SUBMISSIONS

Our submissions follow closely the descriptions in [2, 3], with some minor modifications and additions, which we outline in the following. All submissions predict major and minor chords (and the "no chord" class) only.

1.1 Deep Chroma Chord Recognition (FK4)

This program uses a deep neural network to extract chroma vectors as shown in [2]. We simplified the chroma extraction network: it only uses 3 layers of 256 hidden units, and operates on a frequency range of 60 - 2100 Hz.

The chord sequence is then decoded using a linear-chain Conditional Random Field (CRF) as described in [3].

1.2 CNN Chord Recognition (FK2)

This program uses features learned automatically by a fully convolutional neural network as described in [3]. The architecture differs slightly from the one presented in the paper: instead of padding the feature maps in the first four convolutional layers, we increased the input size accordingly, such that the feature maps after the fourth layer have the same size as in [3]. The input spectrogram thus comprises a frequency range of 60 - 2600 Hz.

The chord sequence is then decoded using a linear-chain Conditional Random Field (CRF) as described in [3].

2. TRAINING

The neural networks and conditional random fields were trained on the following data sets: Beatles, Queen and Zweieck [1], Robbie Williams [2], RWC Popular [3], and the public part of McGill Billboard [4].

3. RESULTS

Table 3 shows the results of our submissions. We only present the numbers for the major/minor task, since our systems do not predict other chord classes, and thus comparisons are futile.

	Iso09	BB12	BB13	JC15	RW16
FK2	85.53 (1)	85.38 (1)	77.89 (1)	78.66 (1)	87.23 (1)
FK4	80.93 (3)	78.62 (2)	71.85 (2)	75.44 (3)	80.96 (2)

Table 1. Results for the MIREX Maj/Min chord recognition task. The rank achieved in the 2016 edition of MIREX is given in parenthesis.

5. REFERENCES

[1] Sebastian Böck, Filip Korzeniowski, Jan Schlüter, Florian Krebs, and Gerhard Widmer. madmom: a new Python Audio and Music Signal Processing Library. `arXiv:1605.07008`, 2016.

[2] Filip Korzeniowski and Gerhard Widmer. Feature Learning for Chord Recognition: The Deep Chroma Extractor. In *Proceedings of the 17th International Society for Music Information Retrieval Conference (ISMIR)*, New York, New York, USA, August 2016.

[3] Filip Korzeniowski and Gerhard Widmer. A Fully Convolutional Deep Auditory Model for Musical Chord Recognition. In *Proceedings of the IEEE International Workshop on Machine Learning for Signal Processing*, Salerno, Italy, September 2016.

[1] http://isophonics.net/datasets
[2] https://www.researchgate.net/publication/260399240_Chord_and_Harmony_annotations_of_the_first_five_albums_by_Robbie_Williams
[3] https://staff.aist.go.jp/m.goto/RWC-MDB/ and https://github.com/tmc323/Chord-Annotations
[4] http://ddmal.music.mcgill.ca/billboard