MIREX 2015 submissions

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ABSTRACT

In extended abstract describes the MIREX 2015 submissions for onset detection, beat tracking and tempo estimation.

Reference implementations of the algorithms are available at `https://github.com/CPJKU/madmom`.

1. ONSET DETECTION

1.1 SB2

The *OnsetDetector.2015* is an improved version of the system introduced in [8].

1.2 SB3

The *OnsetDetectorLL.2015* is an improved version of the system introduced in [1] with updated peak-picking parameters.

1.3 SB4

The *SuperFlux.2015* is an improved version of the system introduced in [7] with updated peak-picking parameters.

1.4 SB5

The *ComplexFlux.2015* is an improved version of the system introduced in [6] with updated peak-picking parameters.

1.5 BK7

The *LogFiltSpecFlux.2015* is an improved version of the system introduced in [2] with updated peak-picking parameters.

2. BEAT TRACKING

2.1 BK1

The *DBNBeatTracker.2015* is an improved version of the system introduced in [3], without the multi-model selection stage. It uses neural network models trained on a broader range of music styles.

2.2 BK2

The *CRFBeatDetector.2015* is an improved version of the system introduced in [9]. It uses the same neural network models as BK1 (Section 2.1) as well as the comb filter tempo estimation introduced in [4].

2.3 BK3

The *DBNBeatTracker.2015* is an improved version of the system introduced in [3]. It uses the same neural network models as BK1 (Section 2.1).

2.4 BK4

The *DBNBeatTracker.2014v2* is the same as BK1 (Section 2.1), but with the same neural networks as last year's submission.

2.5 BK5

The *CRFBeatDetector.2014v2* is the same as BK2 (Section 2.2), but with the same neural networks as last year's submission. Thus the results compared to last year show the impact of the comb filter tempo method [4] compared to the old autocorrelation based temp detection.

2.6 BK6

The *MMBeatTracker.2014v2* is the same as BK3 (Section 2.3), but with the same neural networks as last year's submission. Thus the results compared to last year show the impact of the state space and transition model of [10].

2.7 SB6

The *BeatTracker.2015* is an improved version of the system introduced in [5] (assuming varying tempo). It uses the same neural network models as BK1 (Section 2.1) as well as the comb filter tempo estimation introduced in [4].

2.8 SB7

The *BeatDetector.2015* is an improved version of the system introduced in [5] (assuming constant tempo). It uses the same neural network models as BK1 (Section 2.1) as well as the comb filter tempo estimation introduced in [4].

3. TEMPO ESTIMATION

3.1 SB8

The *TempoDetector.2015* is an improved version of the system introduced in [4], with newly trained networks, the same as used for for the beat tracking algorithms BK1 through BK2 (Section 2.1, 2.2 and 2.3).

3.2 SB9

The *ACFTempoDetector.2015* is the same as SB8 (Section 3.1), but uses the autocorrelation based tempo estimation introduced in [5] to build the tempo histogram. This algorithm is supposed to get inferior results than SB8 (Section 3.1) and included only to get comparative results on the McKinney [11] dataset.

3.3 SB10

The *DBNTempoDetector.2015* is the same as SB8 (Section 3.1), but uses the tempo states of the dynamic Bayesian network of the BK1 system (Section 2.1) to build the tempo histogram. This algorithm is supposed to get inferior results than SB8 (Section 3.1) and included only to get comparative results on the McKinney [11] dataset.

4. ACKNOWLEDGMENTS

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5. REFERENCES

[1] Sebastian Böck, Andreas Arzt, Florian Krebs, and Markus Schedl. Online real-time onset detection with recurrent neural networks. In *Proceedings of the 15th International Conference on Digital Audio Effects (DAFx-12)*, pages 301–304, York, UK, 2012.

[2] Sebastian Böck, Florian Krebs, and Markus Schedl. Evaluating the online capabilities of onset detection methods. In *Proc. of the 13th International Society for Music Information Retrieval Conference (ISMIR)*, pages 49–54, Porto, Portugal, 2012.

[3] Sebastian Böck, Florian Krebs, and Gerhard Widmer. A multi-model approach to beat tracking considering heterogeneous music styles. In *Proc. of the 15th International Society for Music Information Retrieval Conference (ISMIR)*, pages 603–608, Taipei, Taiwan, 2014.

[4] Sebastian Böck, Florian Krebs, and Gerhard Widmer. Accurate tempo estimation based on recurrent neural networks and resonating comb filters. In *Proceedings of the 16th International Society for Music Information Retrieval Conference (ISMIR 2015)*, Malaga, Spain, 2015.

[5] Sebastian Böck and Markus Schedl. Enhanced Beat Tracking with Context-Aware Neural Networks. In *Proceedings of the 14th International Conference on Digital Audio Effects (DAFx-11)*, pages 135–139, Paris, France, 2011.

[6] Sebastian Böck and Gerhard Widmer. Local group delay based vibrato and tremolo suppression for onset detection. In *Proc. of the 14th International Society for Music Information Retrieval Conference (ISMIR)*, pages 589—594, Curitiba, Brazil, 2013.

[7] Sebastian Böck and Gerhard Widmer. Maximum filter vibrato suppression for onset detection. In *Proceedings of the 16th International Conference on Digital Audio Effects (DAFx-13)*, pages 55–61, Maynooth, Ireland, 2013.

[8] Florian Eyben, Sebastian Böck, Björn Schuller, and Alex Graves. Universal onset detection with bidirectional long short-term memory neural networks. In *Proc. of the 11th International Society for Music Information Retrieval Conference (ISMIR)*, pages 589–594, Utrecht, Netherlands, 2010.

[9] Filip Korzeniowski, Sebastian Böck, and Gerhard Widmer. Probabilistic extraction of beat positions from a beat activation function. In *Proc. of the 15th International Society for Music Information Retrieval Conference (ISMIR)*, pages 513–518, Taipei, Taiwan, 2014.

[10] Florian Krebs, Sebastian Böck, and Gerhard Widmer. An Efficient State Space Model for Joint Tempo and Meter Tracking. In *Proceedings of the 16th International Society for Music Information Retrieval Conference (ISMIR 2015)*, Malaga, Spain, 2015.

[11] Martin F. McKinney, Dirk Moelants, Matthew E. P. Davies, and Anssi Klapuri. Evaluation of Audio Beat Tracking and Music Tempo Extraction Algorithms. *Journal of New Music Research*, 36(1):1–16, 2007.