

Applying Rhythmic Similarity based on Inner Metric Analysis to Folksong Research

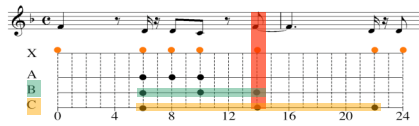
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Inner Metric Analysis

Symbolic metric information

- Metric weight for each note based on local meters (chains of equally based onsets)
- Weight profiles reflect metric hierarchies generated by the notes



$$m(s, d, k) = \{s + id, i = 0, \dots, k\} \subset X$$

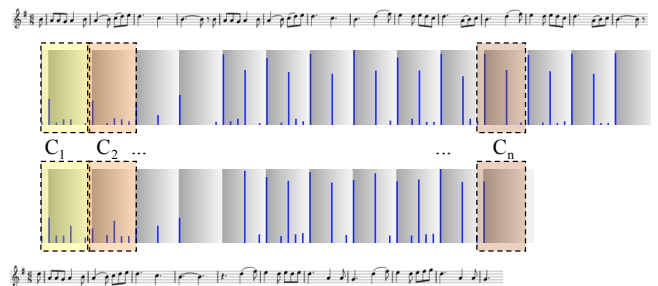
$$M(\ell) = \{m(s, d, k) : k \geq \ell\}$$

$$W_{\ell,p}(o) = \sum_{\{m \in M(\ell) : o \in m\}} k^p$$

Rhythmic Similarity

Measure similarity between metric weights

- Mean of correlation coefficients between weight patches



$$IMA_{c,s} = \frac{1}{\min(n, m)} \sum_{k=1}^{\min(n, m)} c_k$$

Evaluation on Folksongs

Rhythmic similarity as part of melodic similarity

Hypothesis

- Rhythmic similarity plays a central role in melodic similarity

Experiment

- Onder de Groene Linde: collection of Dutch folksongs transmitted through oral tradition; contains many variants for one song
- Test collection of 140 melodies classified into groups of similar melodies
- For each melody group one melody used as query, all other melodies of the corpus ranked according to rhythmic similarity
- $IMA_{c,s}$ compared to *rhytGauss* (*SIMILE*)

Results

Melody Group	Group Size	Mean Rank $IMA_{c,s}$	Mean Rank <i>rhytGauss</i>	F-score $IMA_{c,s}$	F-score <i>rhytGauss</i>
Deze Morgen	15	42.49	38.62	0.581	0.645
Halewijn 2	11	10.18	15.54	0.818	0.273
Halewijn 4	11	26.45	73.64	0.636	0.27
Halewijn 5	8	25.5	46.25	0.375	0.25
Frankrijk 1	11	8.63	15	0.638	0.57
Frankrijk 2	47	45.51	55.53	0.818	0.273
Jonkheer 1	8	39.87	30.37	0.25	0.5
Moeder 1	11	15.27	24.72	0.72	0.54
Deze Morgen 6/8	12	11.08	8.16	0.583	0.75
Frankrijk 2, 6/8	36	24.88	32.41	0.833	0.639
Frankrijk 2, 3/4	11	6.81	17.36	0.909	0.818

Conclusions

- $IMA_{c,s}$ outperforms *rhytGauss* on most of these melody groups
- Many songs can be retrieved by rhythm only
- Rhythmic similarity is an important aspect of melodic similarity



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