

Musical Models for Folk-Song Alignment

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Global Sequence Alignment

An optimal alignment is computed using dynamic programming. A symbol is either aligned with a symbol from the other sequence (substitution) or with a gap. The alignment score, which is the sum of the individual substitution and gap scores, can be interpreted as a similarity score and be used for retrieval.

Musical Models

Representation



Pitch:	a ¹	b ¹	c ²	d ²	e ²	f ²	e ²	d ²
Duration:	1/4	1/8	1/8	1/4	1/4	1/8	1/8	1/4
Scoretime:	0	1/4	3/8	2/4	3/4	4/4	9/8	5/4
Accent:	1	0	0	1	0	1	0	0
Bar:	0	0	0	1	1	2	2	2
[...]								

Substitution Score Functions

All scores $\in [-1, 1]$

Exact Pitch

1 if pitches are the same, -1 otherwise

Exact Duration

1 if durations are the same, -1 otherwise

Chromatic Pitch (Pitch Band)

Score higher if pitches are closer

Harmonic Pitch

Score higher if pitches are harmonically closer

Phrase Contour

Score higher if relative pitch height within phrase contour is more similar

Phrase Position

Score higher if position within phrase is more similar

Inner Metric Analysis

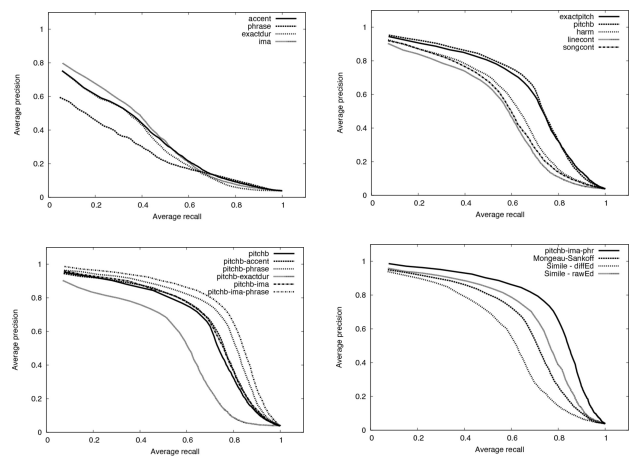
Score higher if metric weight as computed by Inner Metric Analysis is more similar

Combinations of the above by multiplication

Gap Penalty

Gap Opening: 1.0 – Gap Extension: 0.1

Global Retrieval Evaluation



Best configuration: Combination of **Pitch Band**, **IMA** and **Phrase Position**.

The false positives can be evaluated using the expert annotations. Example:

Rank	Incipit	Annotations
query		
1		Rhythm: 2 Contour: 2 Motifs: 2
77		Rhythm: 1 Contour: 1 Motifs: 1
140		Rhythm: 1 Contour: 1 Motifs: 1

Dataset : The Annotated Corpus

360 melodies; 26 classes (tune families)
Annotated and classified by domain experts

For each tune family similarities are annotated:

- ▶ Contour (global / phrase)
- ▶ Rhythm (global / phrase)
- ▶ Motifs
- ▶ Text

Ratings

- 0: dissimilar
- 1: somewhat similar
- 2: similar

Conclusions

Incorporation of musical models improves retrieval performance.

Pitch functions give better results than rhythm functions.

Phrase boundaries are important.

The expert annotations provide explanations for false negatives.



Universiteit Utrecht



Nederlandse Organisatie voor Wetenschappelijk Onderzoek



NWO project no. 640-003 501

