

Testing the Effectiveness of MJD Comparison Algorithms Based on Melodic Line of MJD Music

Abstract:

Music is an easily replicated medium of art.

The purpose of this research is to help upcoming and veteran musicians and composers alike in detecting copyrighted work, as well as avoiding unintended plagiarism of existing work. The group will do this by comparing the effectiveness of four music comparison algorithms, namely Local Alignment, Dynamic Time Warping, Levenshtein Distance, and Pitch Class Sets, and comparing the results against a survey where human subjects are asked to evaluate the similarity of five pairs of songs as well. The results may affect future research on music similarity.

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Research Questions:

Which similarity algorithm is the most effective in detecting music similarity?
What music features are important in determining music similarity?

Methodology:

4 Algorithms

- 1) Local Alignment
- 2) Levenshtein Distance
- 3) Dynamic Time Warping
- 4) Pitch Class Sets

Test their similarity rating on pairs of music

- 1) How Deep Is Your Love vs. Let It End
- 2) Love Is A Wonderful Thing (Michael Bolton) vs. Love Is A Wonderful Thing (Isley Brothers)
- 3) Theme from NBC's Today Show vs. Day By Day
- 4) My Sweet Lord vs. He's So Fine
- 5) Tonight He Sailed Again vs. I Love You, Yes I Do

Human Testing

- 1) Will evaluate similarity of music using a scale and check music features that are similar.
- 2) 30 human test subjects consisting of
 - 10 specialized in music
 - 10 with experience in music but no specialization
 - 10 with no experience in music at all

Conclusion:

Pitch Class Sets performs the closest to human results testing. However, this is inconclusive because there were only a few pairs of songs and human test subjects. At the end of the day, algorithms cannot decide whether a piece is plagiarized or not.

Recommendations:

Take into account other music features like accompaniment, bass line, chord progression, etc.

Results:

	How Deep Is Your Love vs. Let It End	Day By Day vs. Theme from NBC'S Today Show	Love Is A Wonderful Thing (Isley) vs. Love Is A Wonderful Thing (Bolton)	He's So Fine vs. My Sweet Lord	Tonight He Sailed Again vs. I Love You, Yes I Do
Human Testing Average Score	57.65%	71.77%	65.88%	70.59%	50.59%
Local Alignment Product	35.24%	43.56%	29.76%	26.57%	45.17%
Levenshtein Distance	38.89%	58.33%	29.63%	29.17%	44.00%
Pitch Class Sets	68.75%	69.61%	36.73%	74.41%	10.82%
Dynamic Time Warping	25.00%	9.00%	23.00%	20.00%	18.00%

Song Pair	Tone	Rhythm	Pattern
How Deep Is Your Love vs. Let It End	0.82	0.71	0.64
Day By Day vs. Theme from NBC'S Today Show	0.82	0.88	0.94
Love Is A Wonderful Thing (Isley) vs. Love Is A Wonderful Thing (Bolton)	0.65	0.59	0.71
He's So Fine vs. My Sweet Lord	0.76	0.76	0.82
Tonight He Sailed Again vs. I Love You, Yes I Do	0.52	0.24	0.59

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