

Computational Models for the Study of Popular Music as Musical Heritage.

31 maart, 2012

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Outline

Music and Informatics
Popular Music as Musical Heritage

Folk Songs and Popular Music
Cover Song Detection
Sampling in Popular Music

Music and Informatics

Recommended Artists (see all)



Works with
Spotify



Music and Informatics

Recommended Artists (see all)

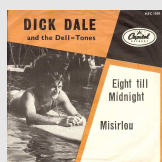


Works with
Spotify

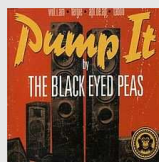


Music Information Retrieval:
research on the modelling,
creation, searching, processing
and use of musical data

Popular Music as Musical Heritage.



Covered



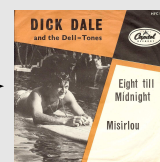
Sampled

Popular Music as Musical Heritage.

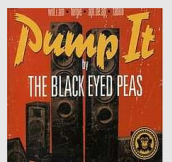
Which musical ideas are reused?

Musicological interest:
where did ideas originate?

Cognitive interest:
how do ideas propagate?



Covered



Sampled

Folk Songs and Popular Music

COGITCH: the hook

'A memorable catch-phrase or melody line which is repeated in a song' (Kuroff, 1982)

'A musical or lyrical phrase that stands out and is easily remembered' (Monaco & Riordan, 1980)

Folk Songs and Popular Music

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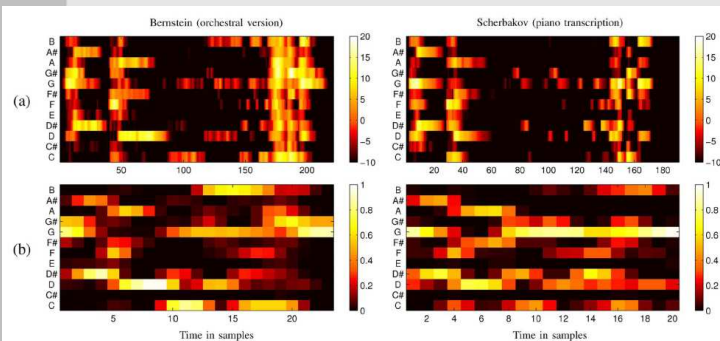
'A musical or lyrical phrase that stands out and is easily remembered' (Monaco & Riordan, 1980)

Hook typology (Burns, 1987)

Paradigms: repetition vs. variation vs. modulation.

Parameters: rhythm, melody, harmony, lyrics, instrumentation, tempo, dynamics, improvisation (incl. accidents), effects, mixing...

Cover Song Identification



F. Kurth and M. Müller, "Efficient Index-Based Audio Matching," IEEE Transactions on Audio, Speech, and Language Processing, vol. 16, no. 2, pp. 382-395, Feb. 2008.

Cover Song Identification

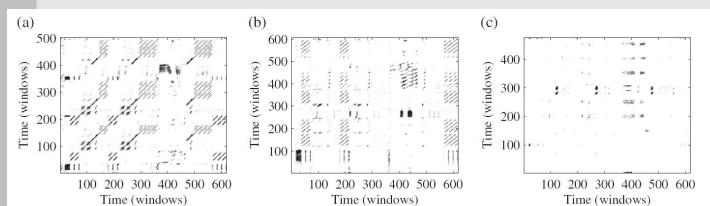
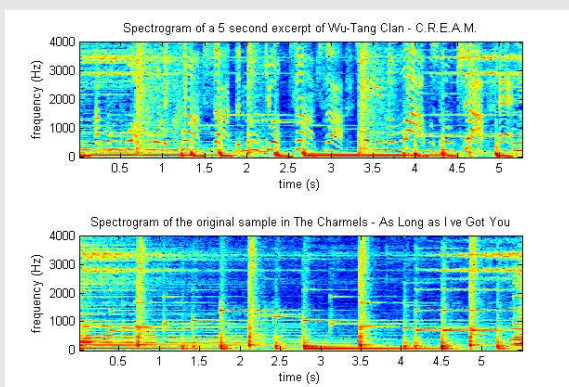


Figure 4. CRPs for the song *Gimme, Gimme, Gimme* as performed by the group ABBA, taken as song *X*, versus three different songs, taken as song *Y*. These are a cover made by the group A-Tsentsis (a), a techno performance of the song *Hung up* by Madonna (b), and the song *The Robots* by Kraftwerk (c). In (a) $L_{max} = 43$ starting at windows (118, 121), in (b) $L_{max} = 34$ starting at windows (176, 130), and in (c) $L_{max} = 16$ starting at windows (373, 245). Parameters are the same as in figure 3.

J. Serra, E. Gomez, P. Herrera, X. Serra, "Chroma Binary Similarity and Local Alignment Applied to Cover Song Identification" IEEE Transactions on Audio, Speech, and Language Processing, 2008.

Sampling in Popular Music



Sampling in Popular Music



N. J. Bryan and G. Wang, "Musical Influence Network Analysis and Rank of Sample-Based Music," in Proceedings of the 12th International Society for Music Information Retrieval Conference, 2011, no. Ismir, pp. 329-334.

Sampling in Popular Music

Database

Restricted to Hip-hop

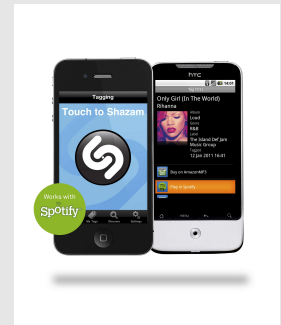
144 tracks:	- title	queries	76
	- artist	candidates	68
	- genre	samples	104
	- year	noise	320
104 samples:	- sampling and sampled song	samples	104
	- start times of samples	relations	94
	- number of occurrences		

Random baselines:

	Mean	Std deviation	Min	Max
MAP	0.017	0.007	0.008	0.043

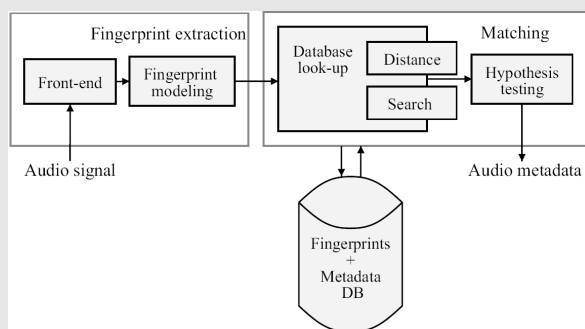
Sampling in Popular Music

Audio fingerprinting



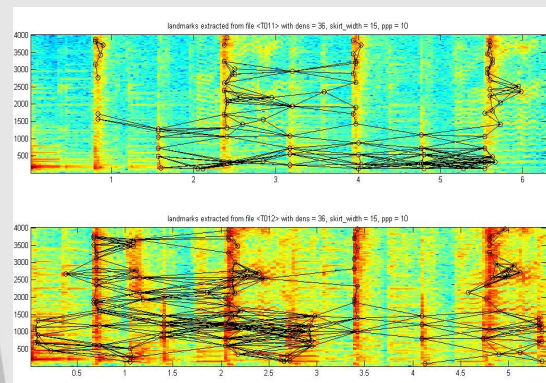
A. L.-C. Wang, "An industrial strength audio search algorithm," in International Conference on Music Information Retrieval (ISMIR), 2003.

Sampling in Popular Music



P. Cano, E. Battle, T. Kalker, and J. Haitsma, "A review of algorithms for audio fingerprinting," 2002 IEEE Workshop on Multimedia Signal Processing., pp. 169-173, 2002.

Sampling in Popular Music



Sampling in Popular Music

Repitch-free fingerprints

$$L = \{ t_1, f_1, f_2, \Delta t \}$$

$$h = f_1 \cdot 2^{(m+n)} + \Delta f \cdot 2^n + \Delta t$$

$$h = (f_1 \cdot \Delta t) \cdot 2^n + (\Delta f \cdot \Delta t)$$

$$M = \{ t_1, \Delta f, (f_1 \cdot \Delta t), (\Delta f \cdot \Delta t) \}$$



Sampling in Popular Music

Repitch-free fingerprinting

N_W	H_W	SR	$N(ms)$	$H(ms)$	X	MAP_n	MAP_a
12	6	2000	128	64		0.218	0.218
12	6	2000	128	64	1	0.218	0.198
12	6	2000	128	64	2	0.218	0.174
12	6	2000	128	64	3	0.218	0.145

Table 6.1: Results of experiments with the repitch-free landmarks. In the three last experiments, the extracted landmarks were duplicated 3^X times and varied in an attempt to predict rounding effects.