

**Perspectives for
Computational
Jazz Studies**

Using Domain Knowledge for Automatic Structure Analysis of Jazz Recordings

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Thanks to the Band!



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Dittmar



Jonathan
Driedger



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López-Serrano



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Weiß



Frank
Zalkow



Jakob
Abeßer

Motivation



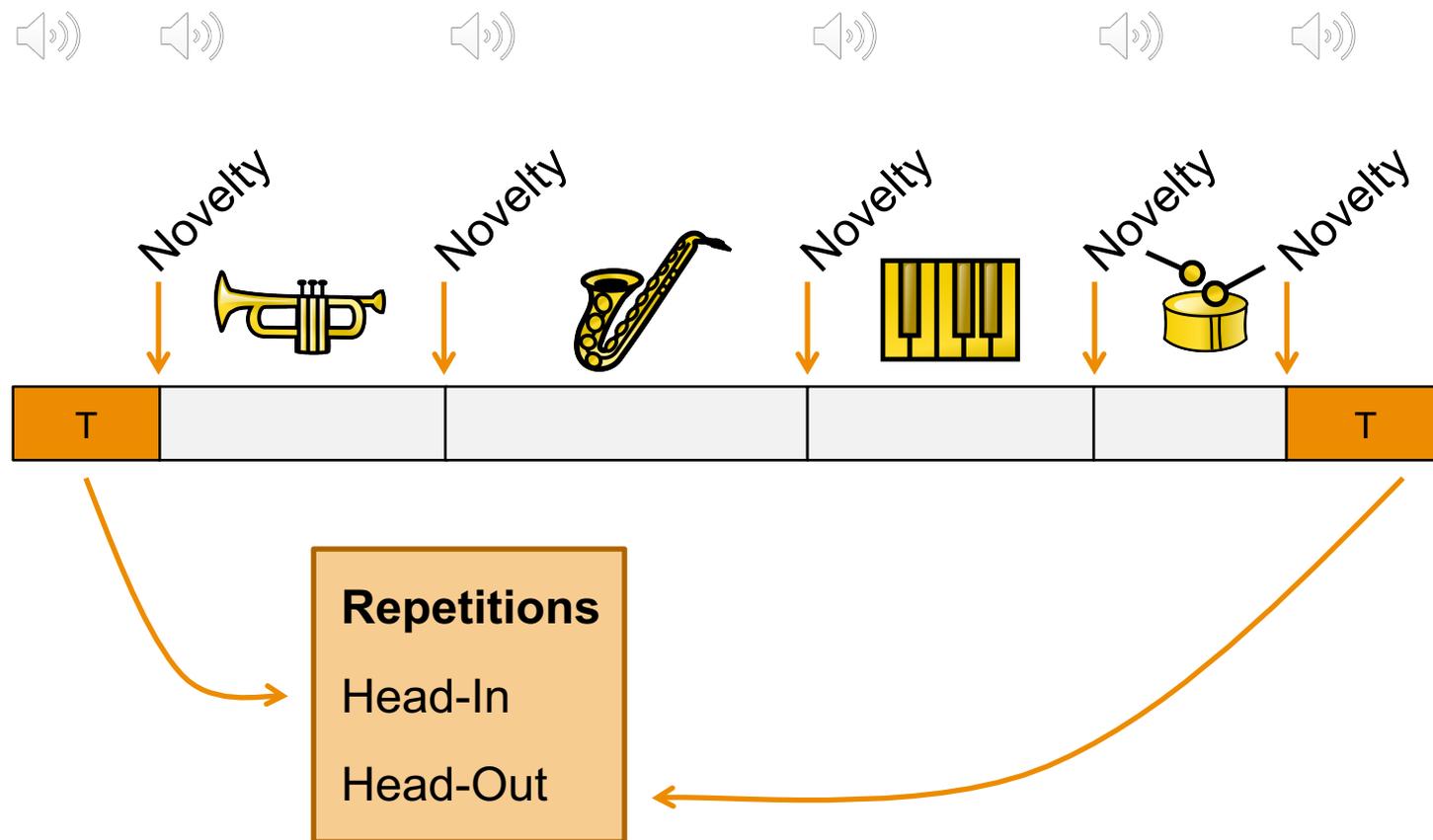
YouTube DE clifford brown jordu

Clifford BROWN Max ROACH
GEORGE MORROW HAROLD LAND RICIE POWELL
DELILAH
PARISIAN THOROUGHFARE
THE BLUES WALK
DAAHOUD
JOY SPRING
JORDU
WHAT AM I HERE FOR

1:29 / 7:43

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Basic Structure



Instrument Comics by H. Grohganz: <https://mir.sechsstel.de/orchpics/>

Solo-Centric Annotations



Transcription



Beats

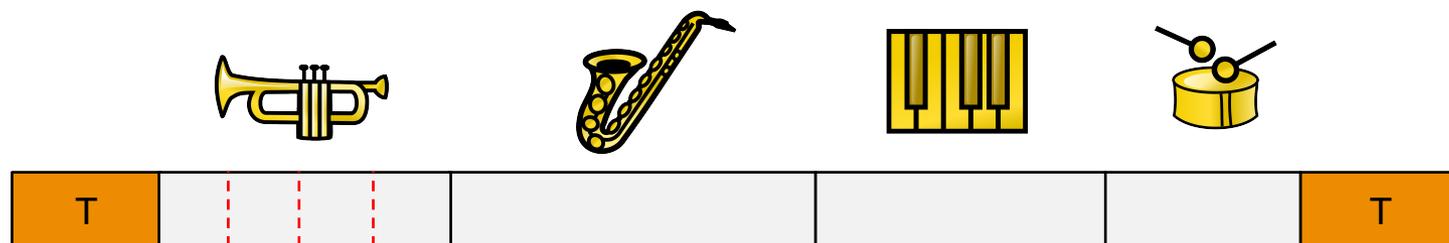
| E⁷ A⁷ | D⁷ G⁷ | ...

Chords

...



Song-Centric Annotations

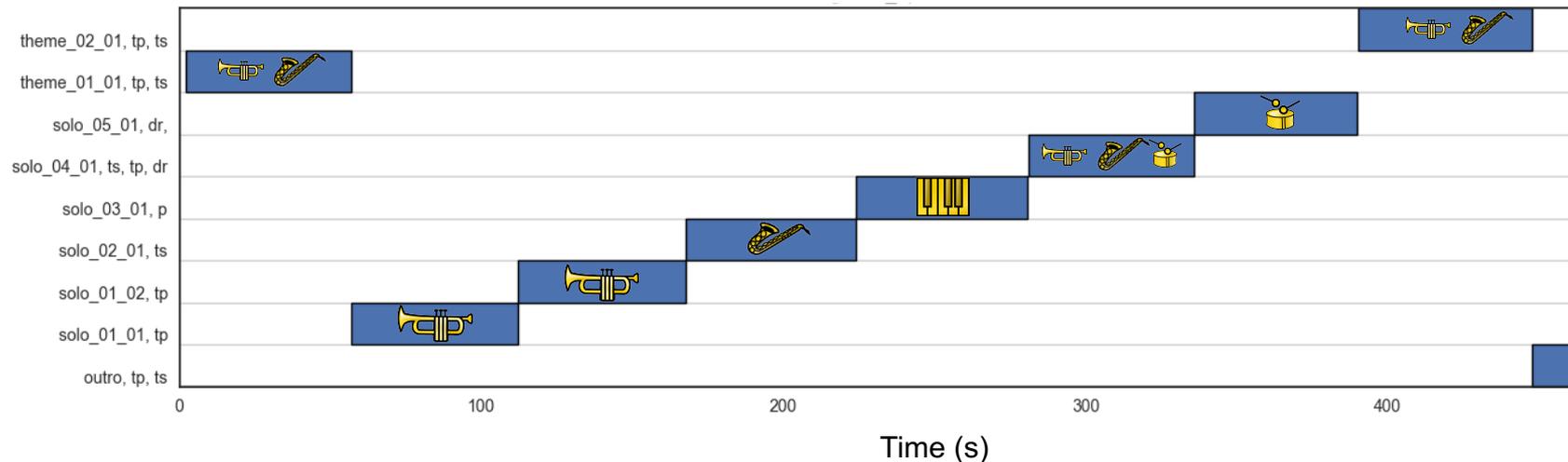


Payback Time

New annotations from the groups in Erlangen/Weimar!

Annotation Example from the Weimar Jazz DB

Clifford Brown - Jordu



Song-Centric Annotations:

- Chorus boundaries
- Solo choruses
- Theme repetitions

Thank you,
Moritz Berendes!

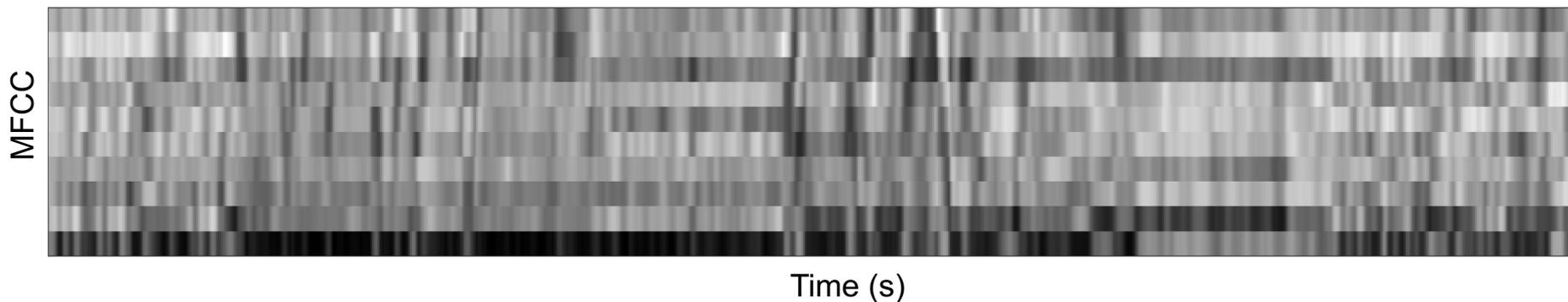
Automatic Structure Analysis (MIR)

- Active research direction since ~20 years.
- Main principles:
 - **Repetition**-based Structure Analysis
 - **Homogeneity**-based Structure Analysis
 - **Novelty**-based Structure Analysis

Self-Similarity Matrix



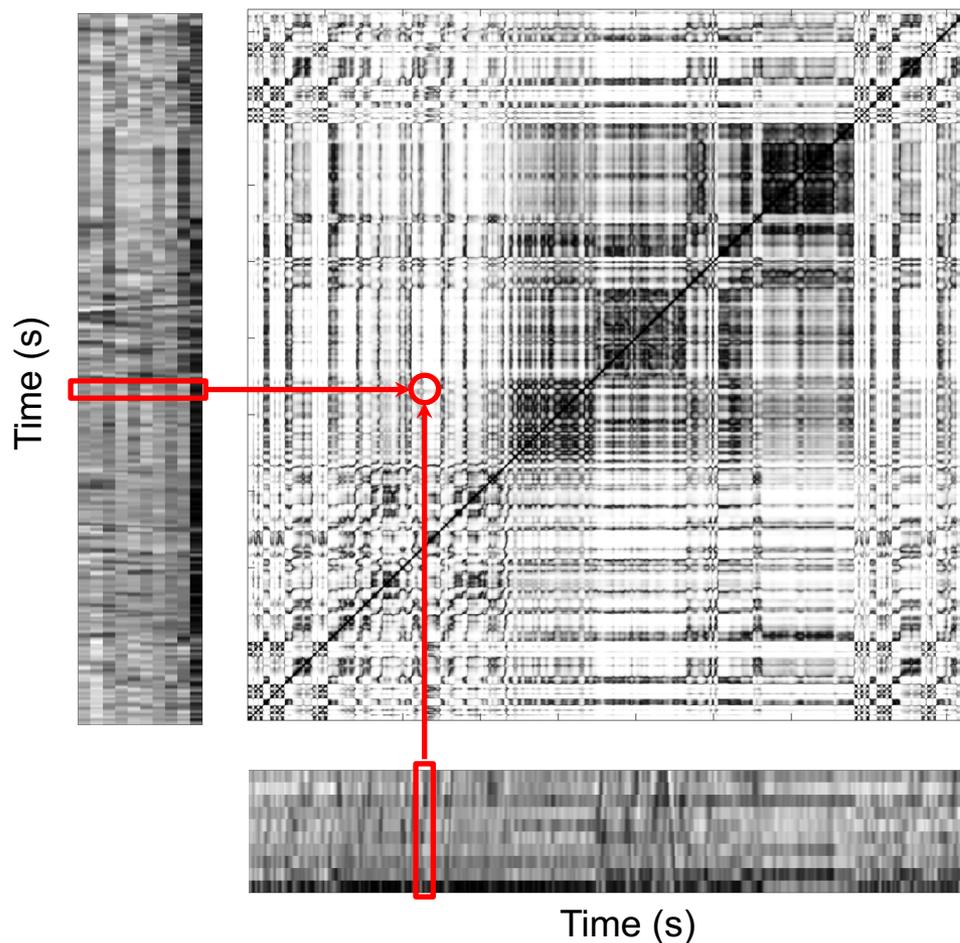
1. Step: Extract Audio Features



- Mel Frequency Cepstral Coefficients (MFCC) correlate to the timbre.

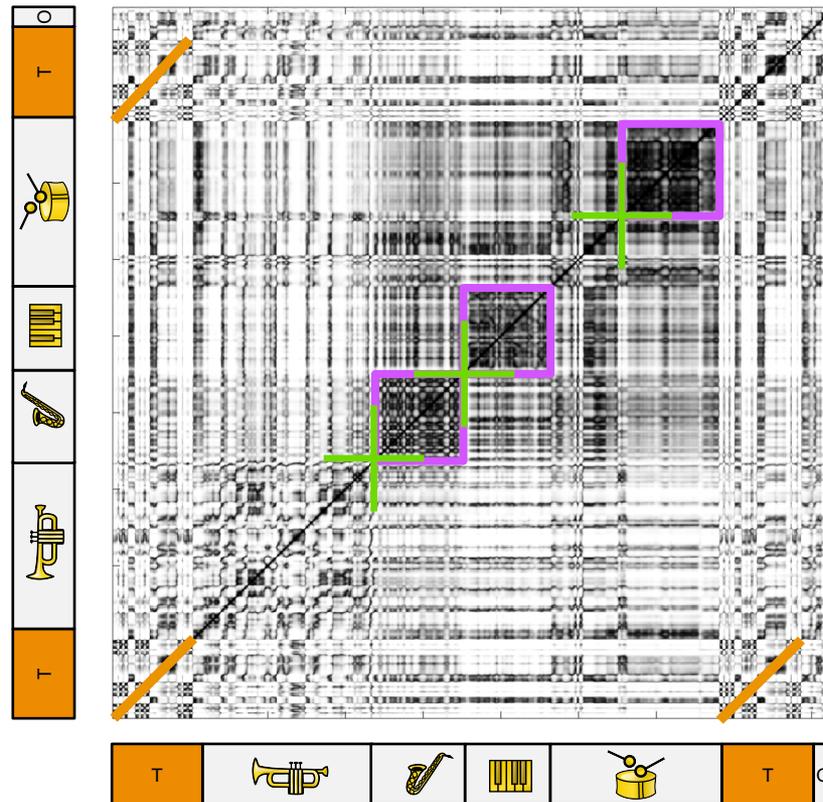
Self-Similarity Matrix

2. Step: Calculate Pairwise Similarity



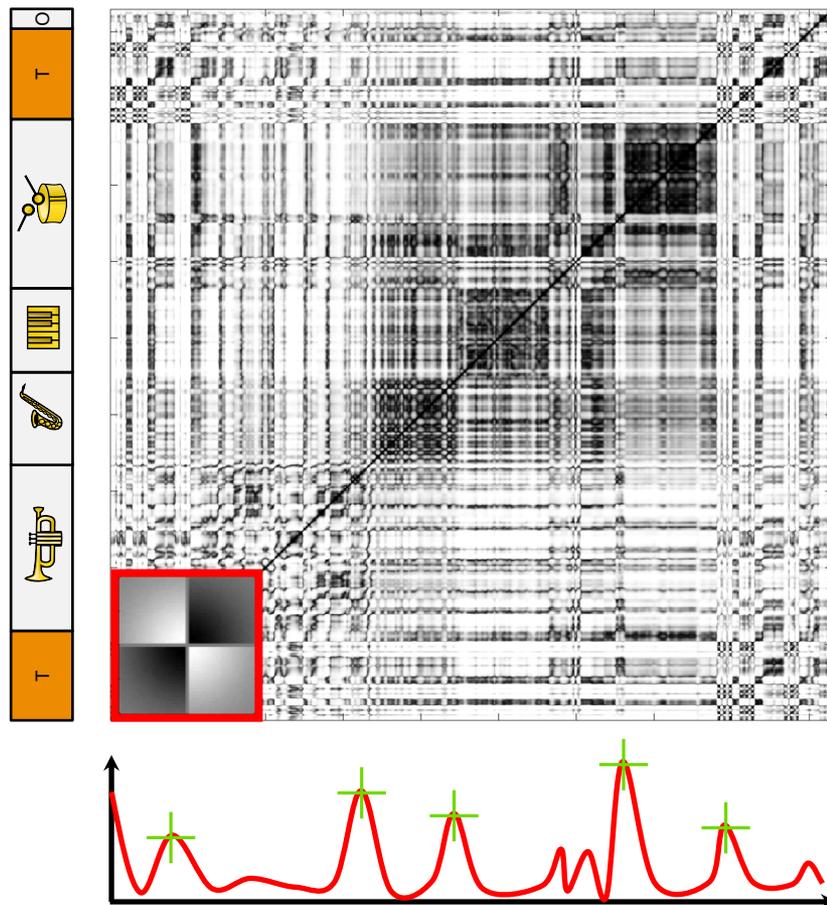
Self-Similarity Matrix Analysis

- Repetitions:
Path-like structures
- Homogeneity:
Block-like structures
- Novelty:
Corners



Self-Similarity Matrix

Novelty Detection



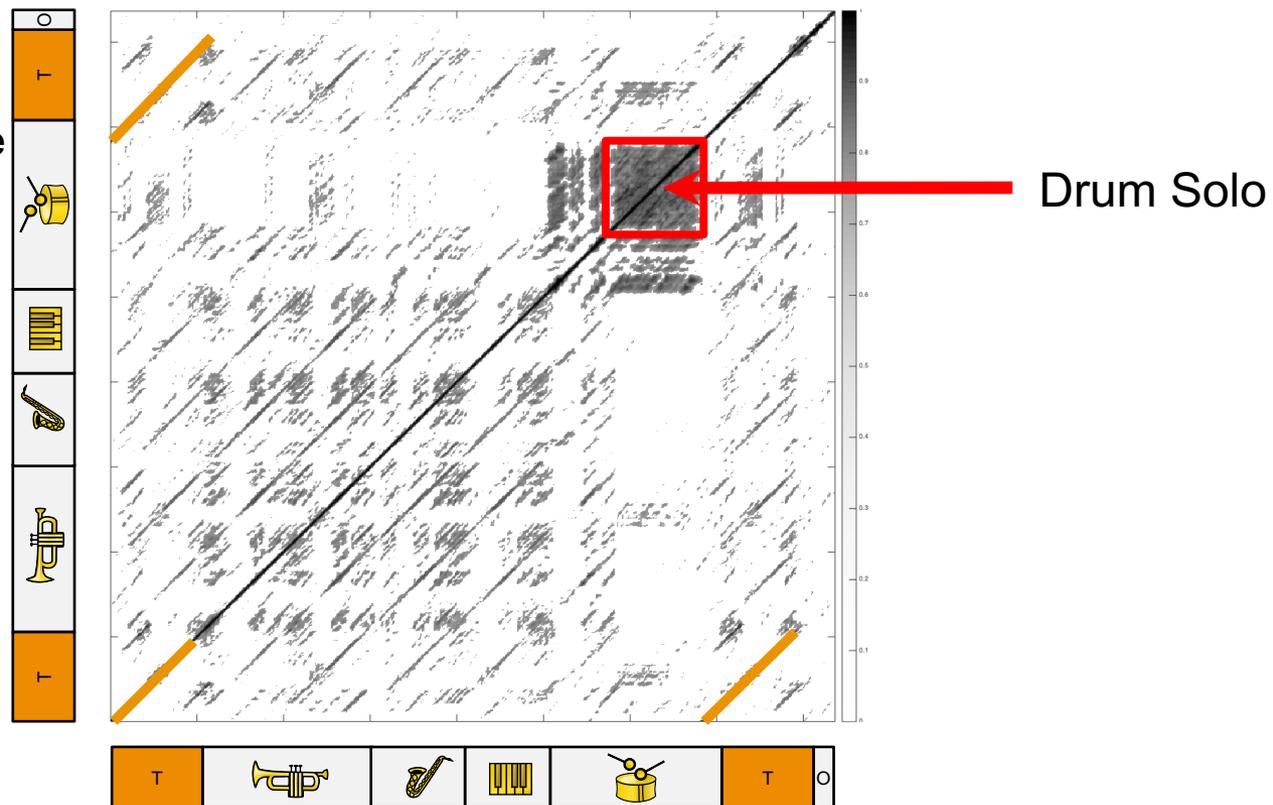
Idea (Foote):

Use checkerboard-like kernel function to detect corner points on main diagonal of SSM.

Self-Similarity Matrix

Chroma Features

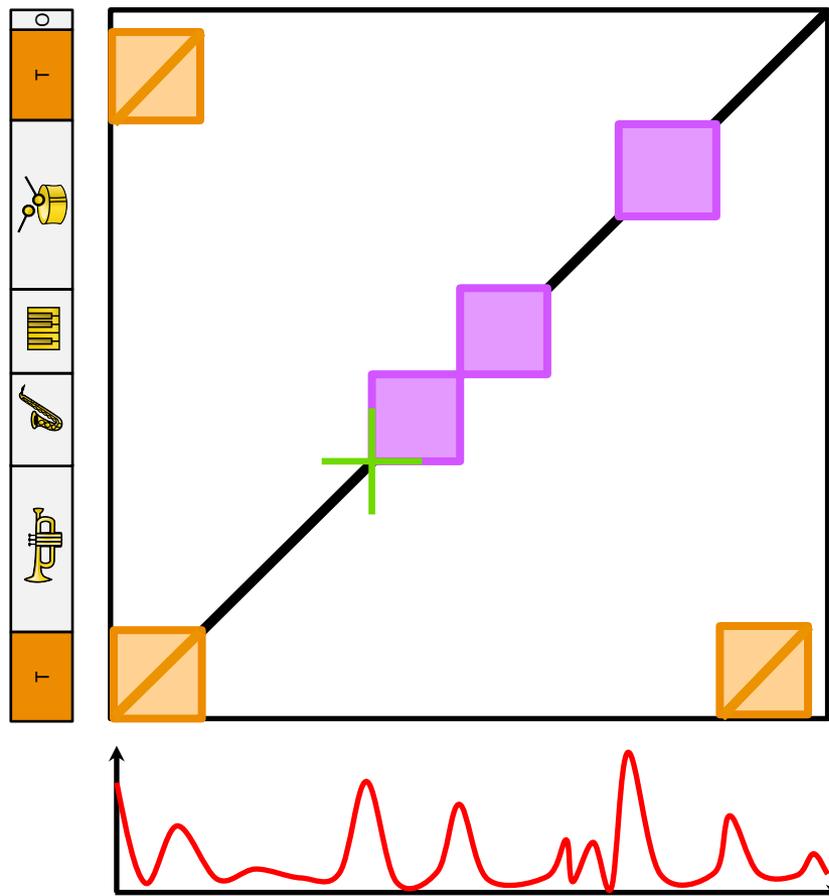
- Chroma instead of MFCC
- Repetitions result in path-like structures
- Head-In and Head-Out



Self-Similarity Matrix

Recap

- Repetitions:
Path-like structures
- Homogeneity:
Block-like structures
- Novelty:
Corners
- Features are important!



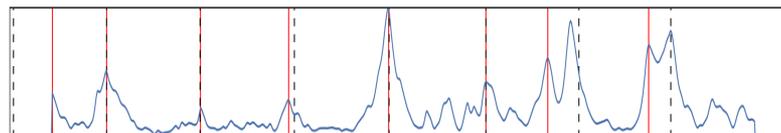
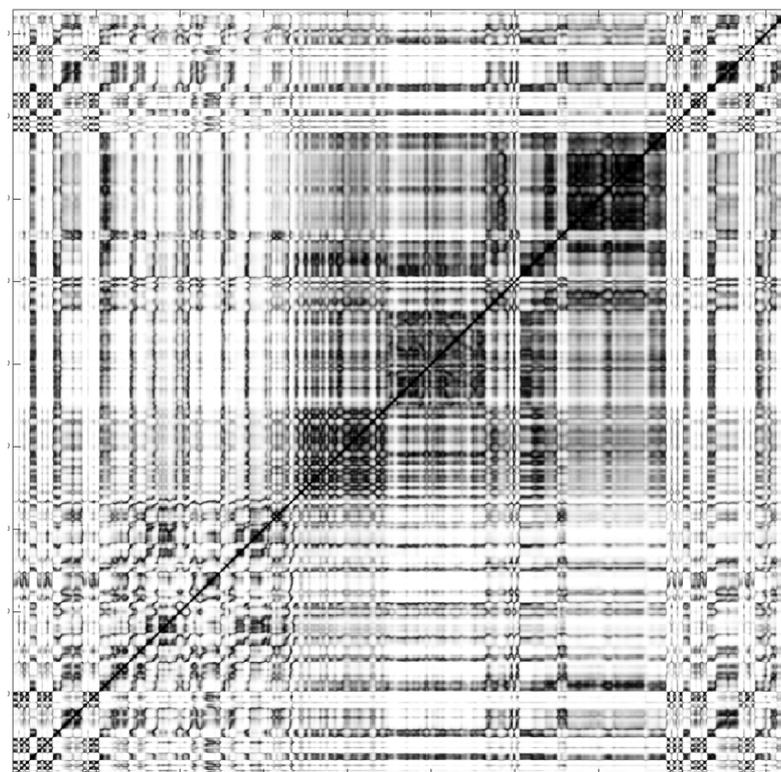
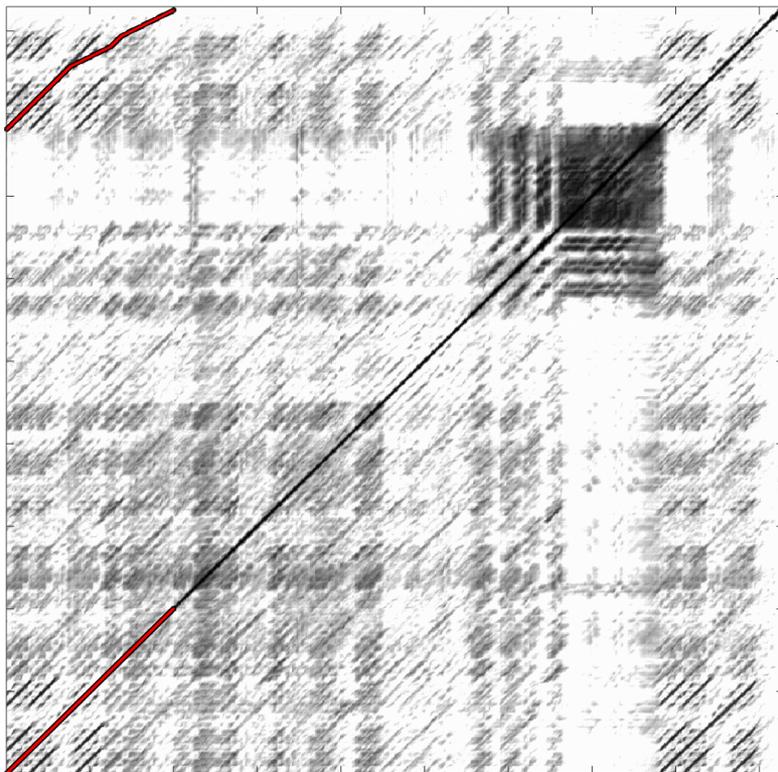
Preliminary Results

Clifford Brown – Jordu



Chroma

MFCC

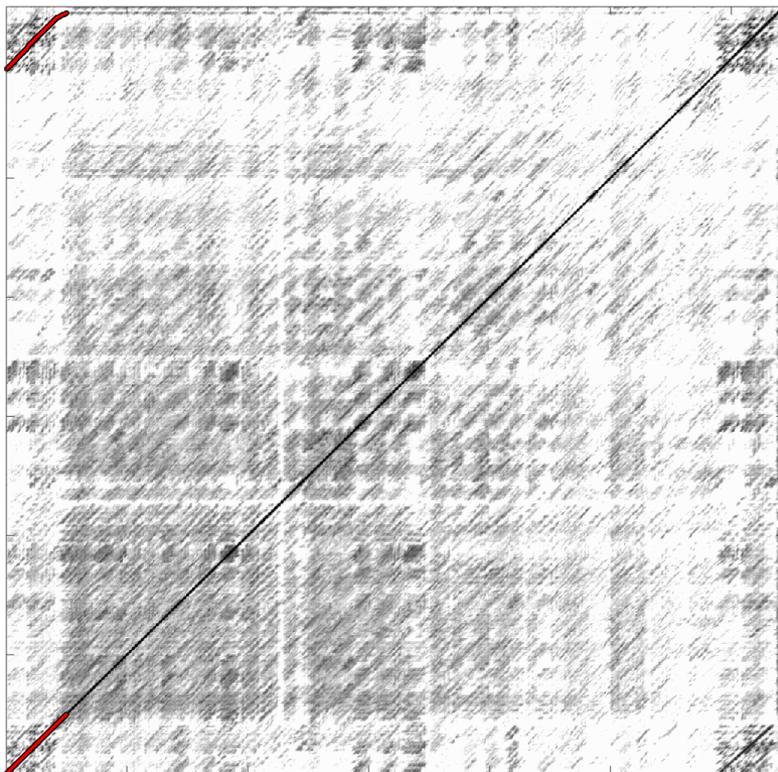


Preliminary Results

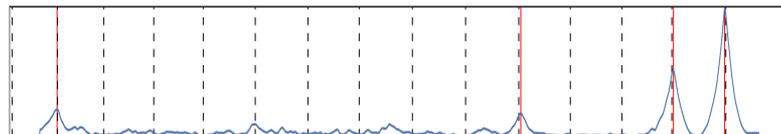
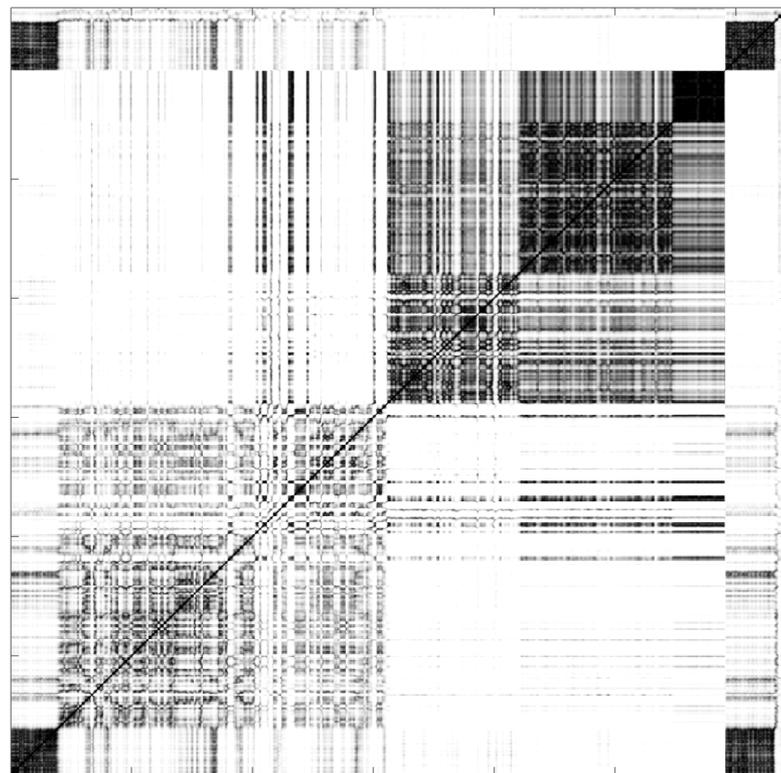
John Coltrane – Blue Trane



Chroma



MFCC

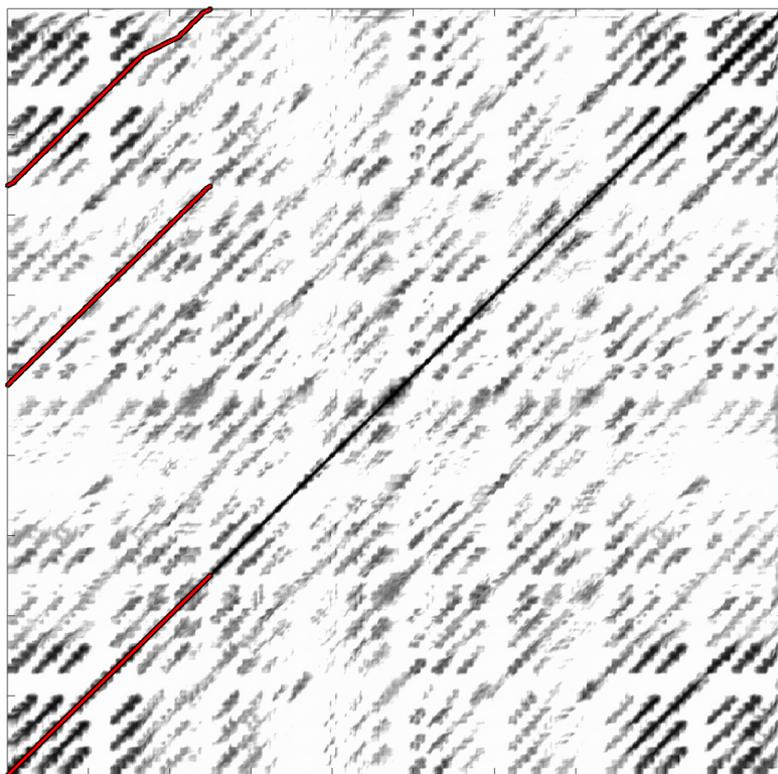


Preliminary Results

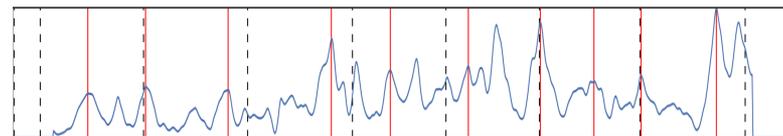
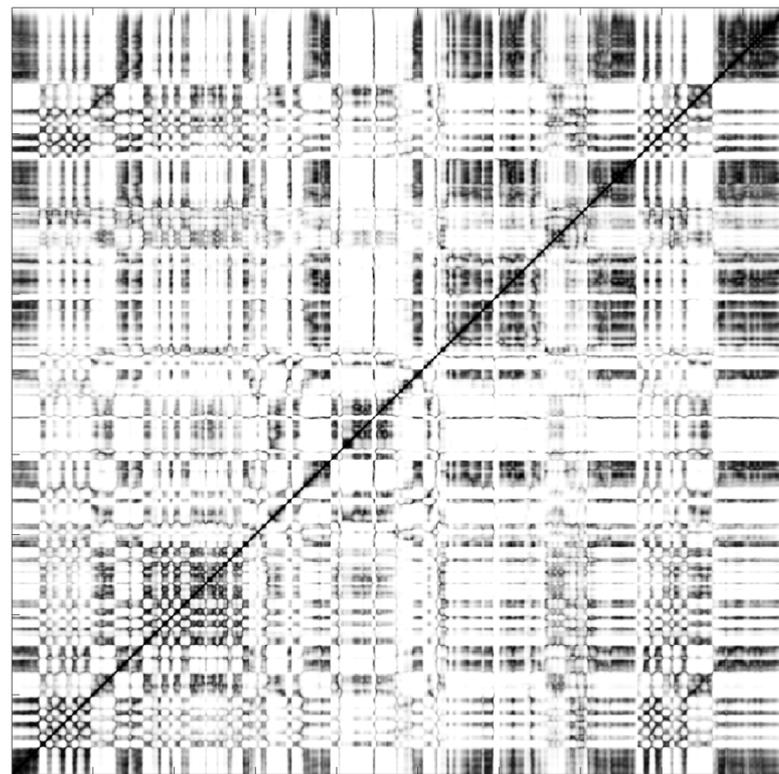
Herbie Hancock – Maiden Voyage



Chroma

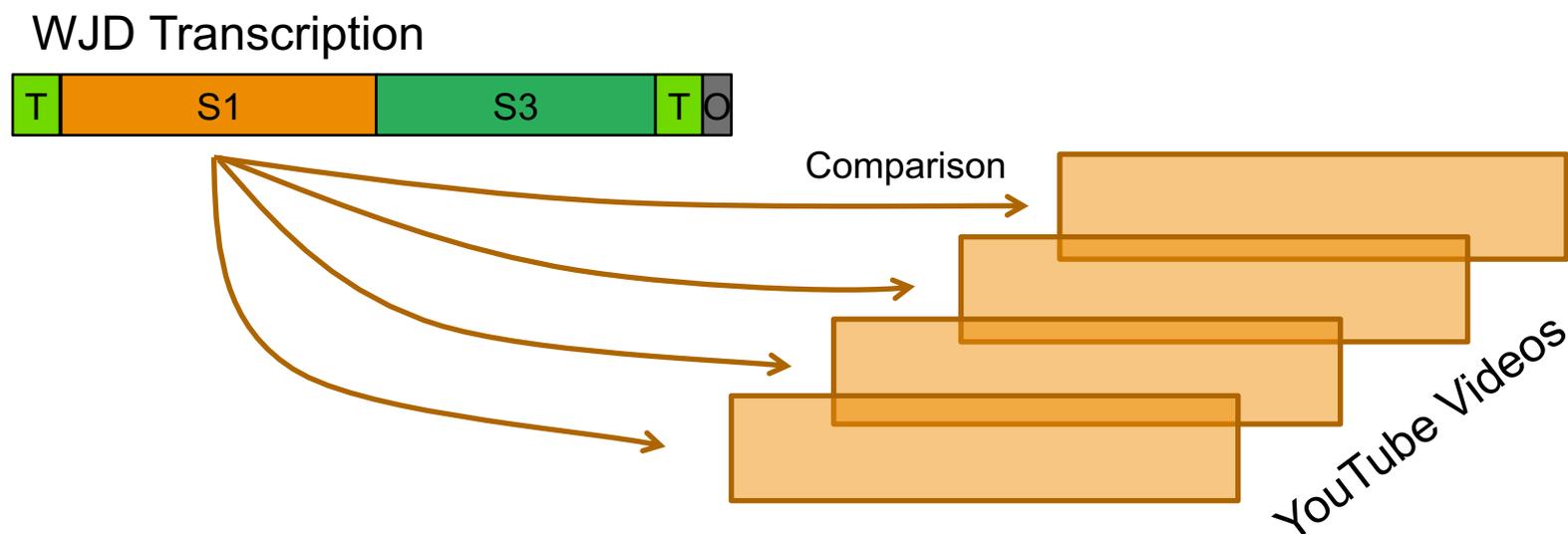


MFCC



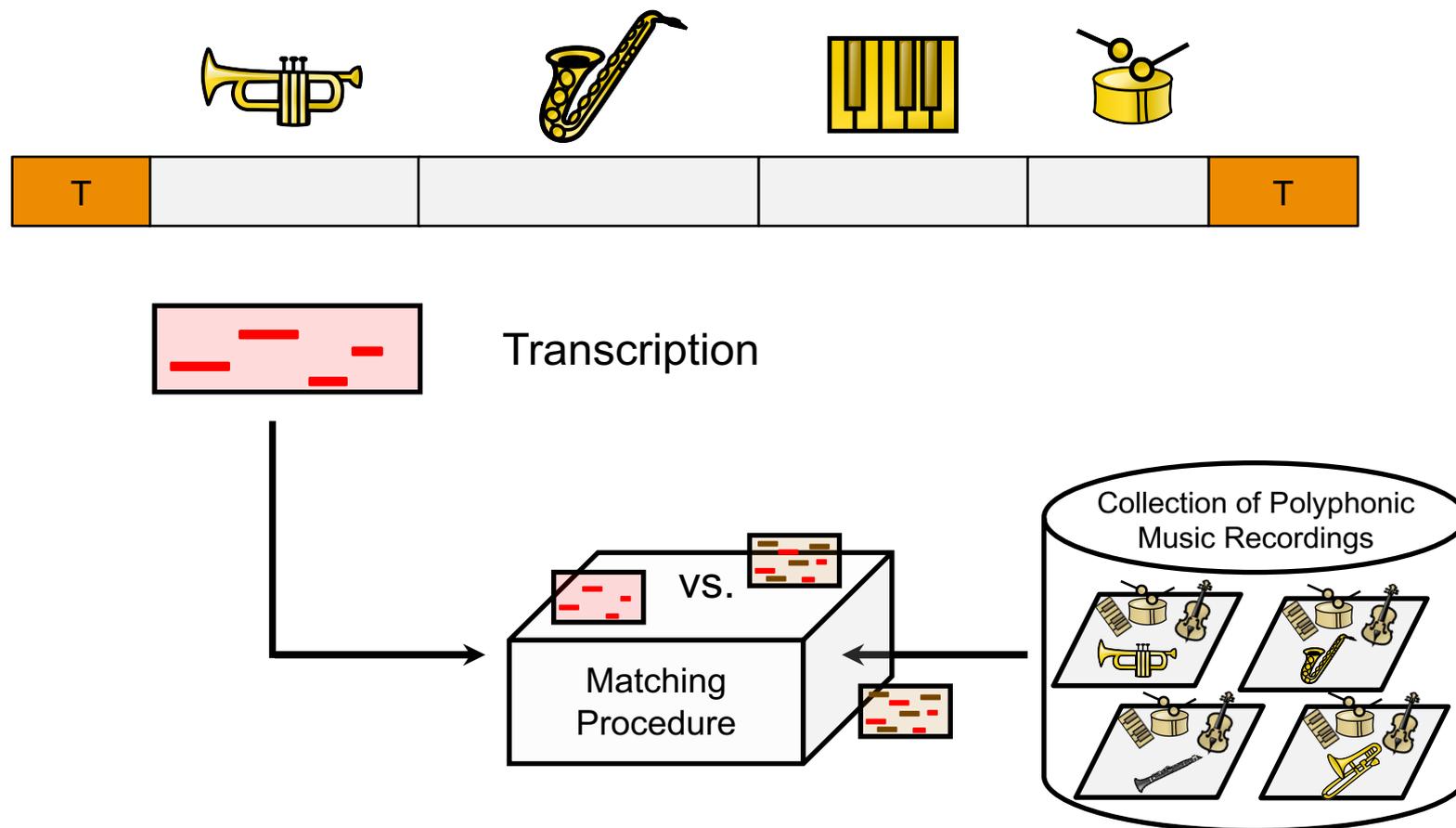
Retrieval Approach

- Motivation: Lots of Recordings are available on YouTube.
- Use Solo Transcriptions for Version Identification
- Possible Sources: YouTube, Soundcloud, etc.



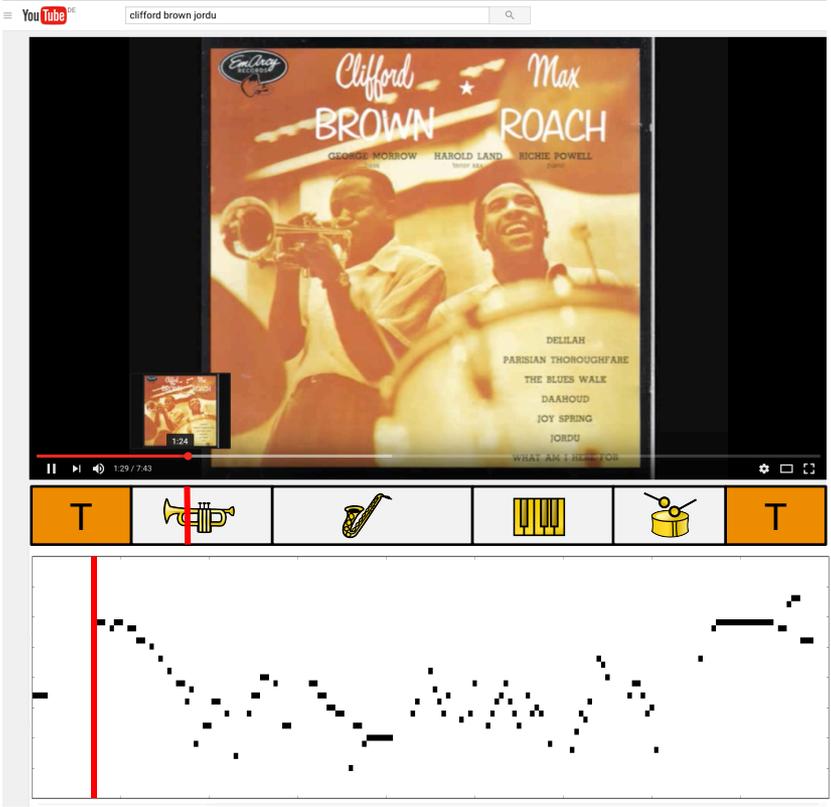
There's more than one way to bake a cake...

Retrieval Approach



Conclusions

- WJD contains very cool annotations!
- Additional song-centered annotations
- Enrich listening experience
- Annotations will be made available soon!



The image shows a YouTube video player interface. The video title is "clifford brown jordu". The album cover features Clifford Brown and Max Roach, with other musicians listed: George Morrow, Harold Land, and Richie Powell. The track list includes "Delilah", "Parisian Thoroughfare", "The Blues Walk", "Daahoud", "Joy Spring", and "Jordu". Below the video player, there is a control bar with icons for transcription (T), trumpet, saxophone, piano, drums, and another transcription (T) icon. Below the control bar is a waveform visualization of the audio, with a red vertical line indicating the current playback position at 1:29 / 7:43.