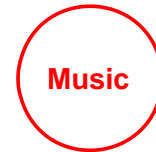


Lecture
Music Processing Analysis (MPA)

Overview

Meinard Müller
International Audio Laboratories Erlangen
meinard.mueller@audiolabs-erlangen.de

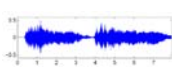


Music Information Retrieval (MIR)

Sheet Music (Image)



CD / MP3 (Audio)



MusicXML (Text)



Dance / Motion (Mocap)



MIDI



Singing / Voice (Audio)



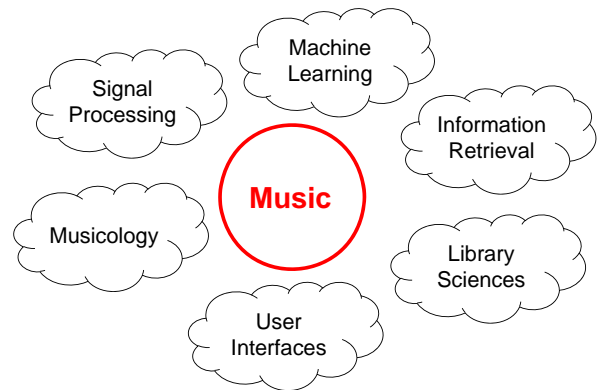
Music Film (Video)



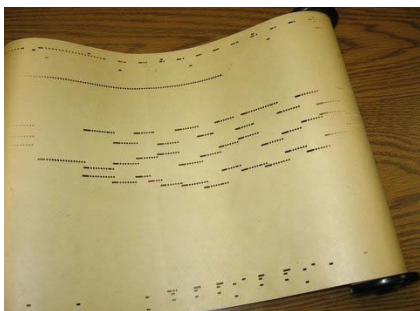
Music Literature (Text)



Music Information Retrieval (MIR)



Piano Roll Representation

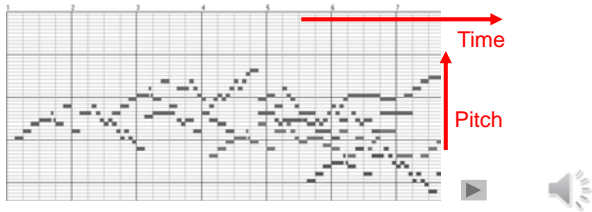


Player Piano (1900)



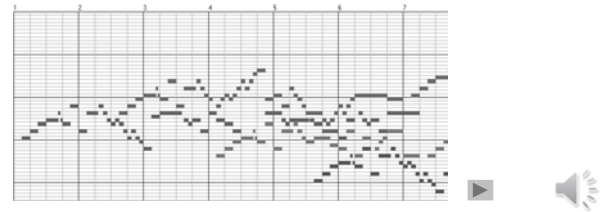
Piano Roll Representation (MIDI)

J.S. Bach, C-Major Fuge
(Well Tempered Piano, BWV 846)



Piano Roll Representation (MIDI)

Query: 
Goal: Find all occurrences of the query

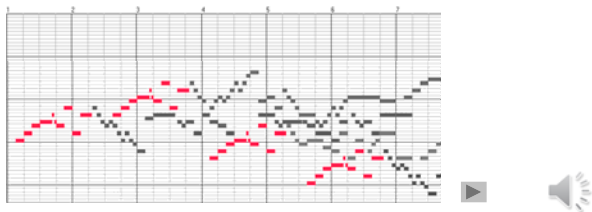


Piano Roll Representation (MIDI)

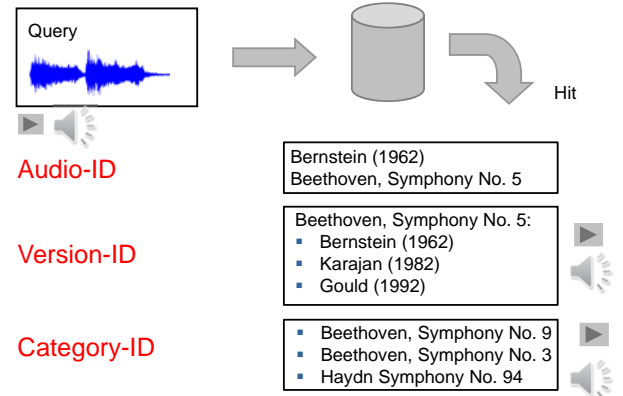
Query: 
Goal: Find all occurrences of the query



Matches:



Music Retrieval



Music Synchronization: Audio-Audio

Beethoven's Fifth

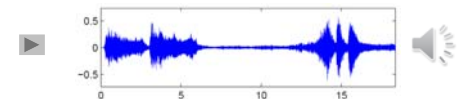


Music Synchronization: Audio-Audio

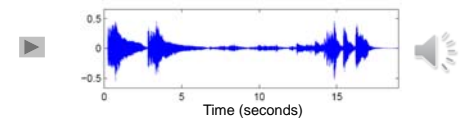
Beethoven's Fifth



Orchester
(Karajan)



Piano
(Scherbakov)

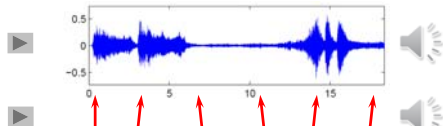


Music Synchronization: Audio-Audio

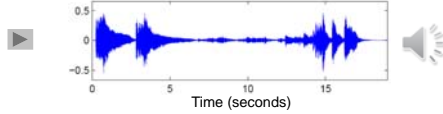
Beethoven's Fifth



Orchester (Karajan)



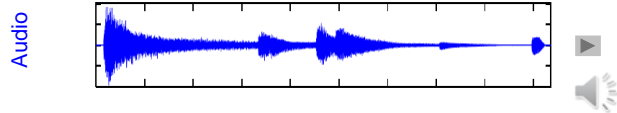
Piano (Scherbakov)



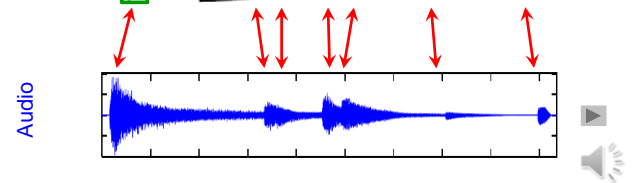
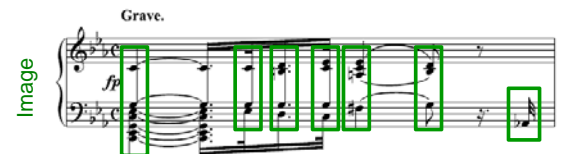
Application: Interpretation Switcher



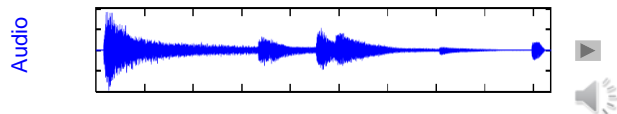
Music Synchronization: Image-Audio



Music Synchronization: Image-Audio

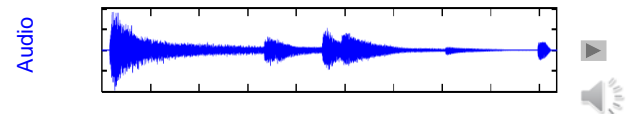
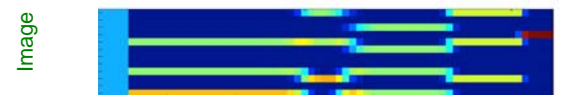


How to make the data comparable?



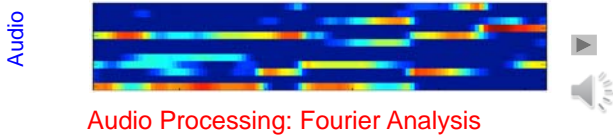
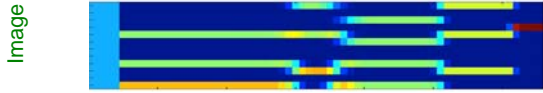
How to make the data comparable?

Image Processing: Optical Music Recognition



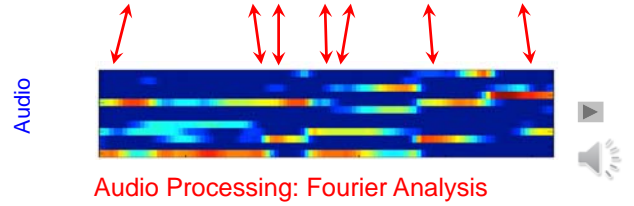
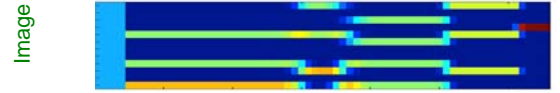
How to make the data comparable?

Image Processing: Optical Music Recognition



How to make the data comparable?

Image Processing: Optical Music Recognition

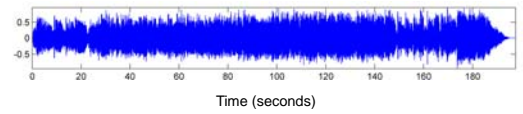


Application: Score Viewer



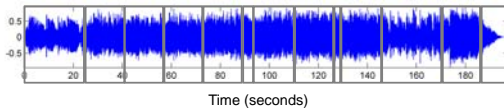
Music Structure Analysis

Example: Zager & Evans "In The Year 2525"



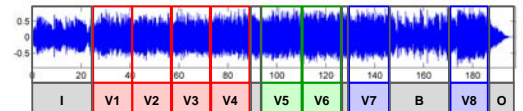
Music Structure Analysis

Example: Zager & Evans "In The Year 2525"



Music Structure Analysis

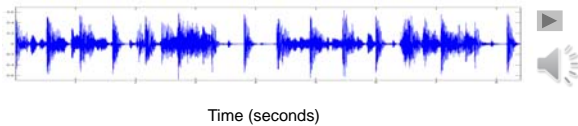
Example: Zager & Evans "In The Year 2525"



Tempo Estimation and Beat Tracking

Basic task: "Tapping the foot when listening to music"

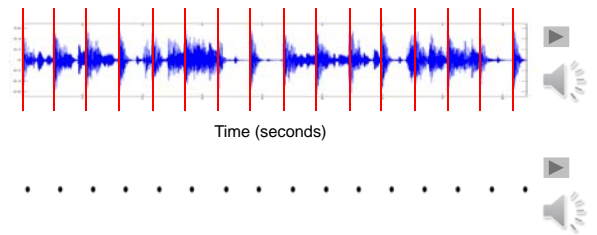
Example: Queen – Another One Bites The Dust



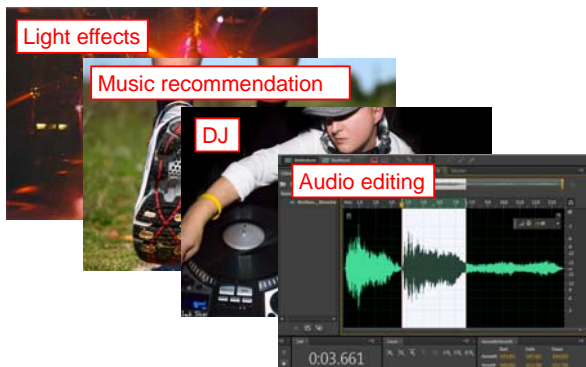
Tempo Estimation and Beat Tracking

Basic task: "Tapping the foot when listening to music"

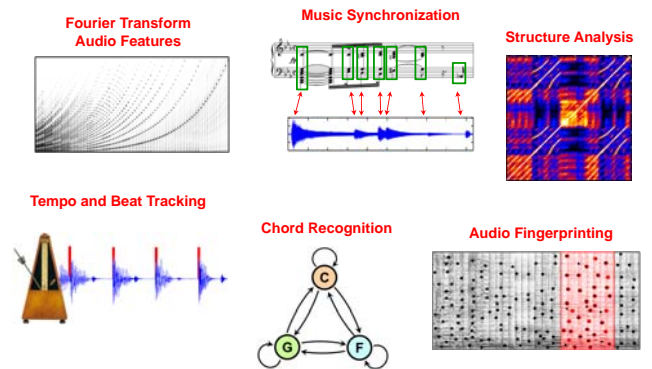
Example: Queen – Another One Bites The Dust



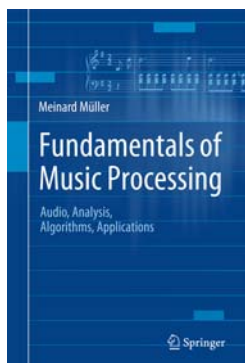
Tempo Estimation and Beat Tracking



Music Processing



Book: Fundamentals of Music Processing



Meinard Müller
 Fundamentals of Music Processing
 Audio, Analysis, Algorithms, Applications
 483 p., 249 illus., hardcover
 ISBN: 978-3-319-21944-8
 Springer, 2015

Accompanying website:
www.music-processing.de

Book: Fundamentals of Music Processing

| Chapter | Music Processing Scenario |
|---------|--|
| 1 | Music Representations |
| 2 | Fourier Analysis of Signals |
| 3 | Music Synchronization |
| 4 | Music Structure Analysis |
| 5 | Chord Recognition |
| 6 | Tempo and Beat Tracking |
| 7 | Content-Based Audio Retrieval |
| 8 | Musically Informed Audio Decomposition |

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