

LFE Medieninformatik - René Klüber

Diploma Thesis – final report

ThumbnailDJ: Visualizing music collections based on visual thumbnails

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Outline

- Motivation
- Related Work
- Preliminary Exploration
 - Initial concepts & Online survey
 - Concept refinement & Expert Interviews
- Final Concept
- Implementation
- Evaluation
- Conclusion & Future Work

Motivation:

- Increasing size of digital media collection
- Limited possibility of comparison



(<http://dustandgrooves.com>)

last.fm Music Radio Events Videos Charts Community Join Login

Spieler: Sony Fantasy Festival auf Last.fm English | Help Music search

Last.fm recommends music, videos and concerts based on what you listen to.

For example, people who like Static-X also like *Dope*, *Fear Factory* and *Mudvayne*. Who do you like?

Type an artist

Or try *Ophth*, *Ladytron*, *Florence + The Machine* or *Broken Social Scene*.

Personalised Visual Radio
With combo stations, history, stats and more

Last.fm turns what millions of people listen to into the perfect mix for you.

All Rock Indie Electronic Pop Metal Hip-hop Jazz Classical Country

(<http://www.last.fm>)

iTunes

AirportJetsDocking.mp3
Civilisation Soundscapes 5.1

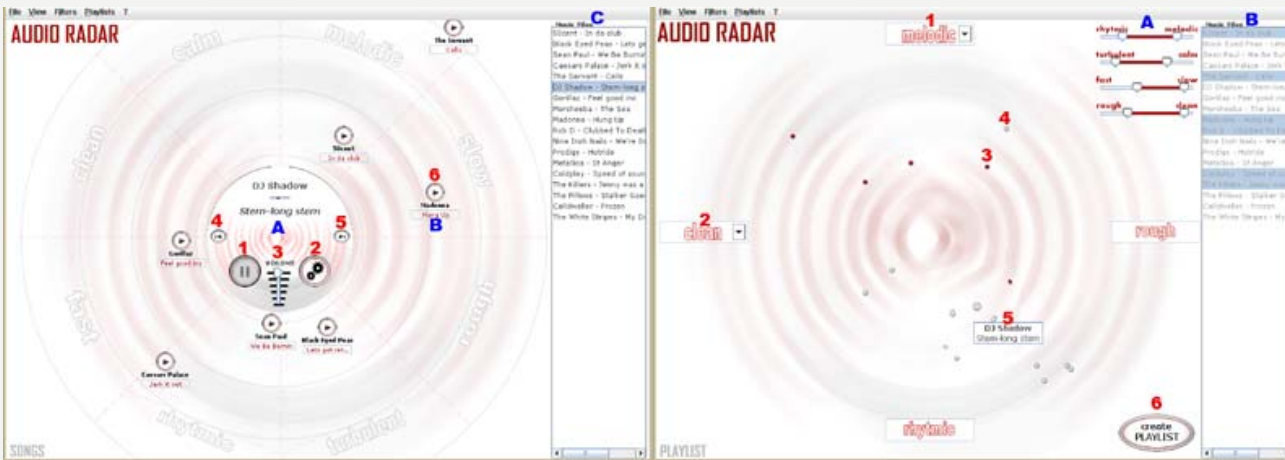
1:10 -2:50

	Titelname	Dauer	Interpret	Album	Genre
1	AirportA340TakeOff.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Airport, Ambience
2	AirportEmptyRunway.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Airport, Ambience
3	AirportJetRumbles.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Airport, Ambience
4	AirportJtsDocking.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Airport, Ambience
5	AirportJtsTakeOff.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Airport, Ambience
6	AirportNightTakeOff.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Airport, Ambience
7	AirportOnlyBackground.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Airport, Ambience
8	AlleyChildrenLoud.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	City, Ambience
9	AlleyCityPedestrians.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	City, Ambience
10	AlleyCityPedZone.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	City, Ambience
11	AlleyCityQuietBirds.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	City, Ambience
12	AlpsCowbellsMary.mp3	3:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
13	AlpsCricketsAtmosphere.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
14	AlpsCricketfield1.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
15	AlpsCricketfield2.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
16	AlpsCricketfieldAiry.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
17	AlpsCricketsBirds.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
18	AlpsDistantVillage.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
19	AlpsForestAtmosphere.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
20	AlpsSummermeadow.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
21	AlpsVillageTraffic.mp3	4:00	SoundEffects.ch	Civilisation Soundscapes 5.1	Alps, Ambience
22	AudienceAppl120014s.mp3	0:16	SoundEffects.ch	Civilisation Soundscapes 5.1	Crowd, Applause
23	AudienceAppl120022s.mp3	0:25	SoundEffects.ch	Civilisation Soundscapes 5.1	Crowd, Applause

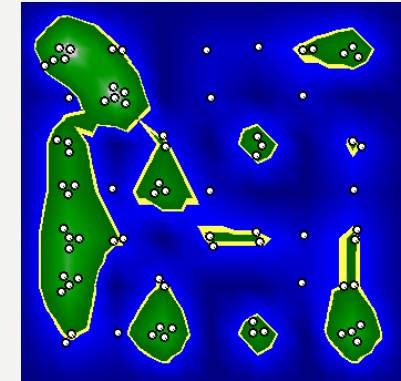
(<http://www.apple.com/itunes>)



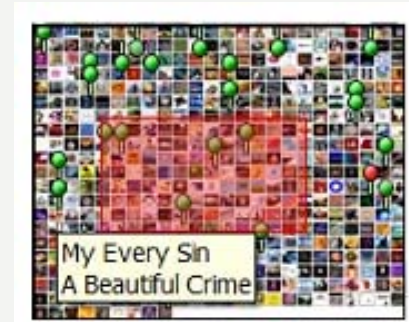
• Displaying Music Collections



- AudioRadar (Hilliges et al., 2006)

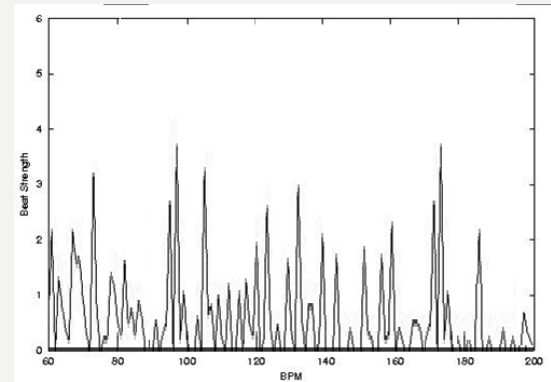


- Islands of Music (Pampalk et al., 2002)

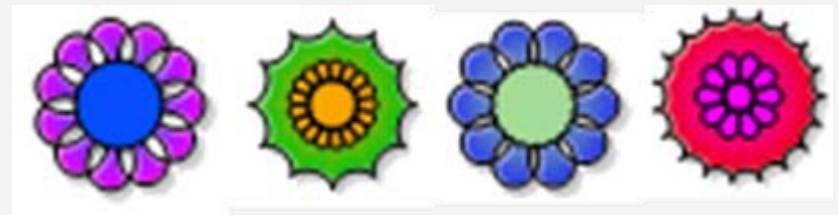


- iCandy (Graham and Hull, 2008)

- Visualizing Music Files as Thumbnails



- Arc Diagrams (Wattenberg, 2002) - Beat Histograms (Tzanetakis and Cook, 2002)



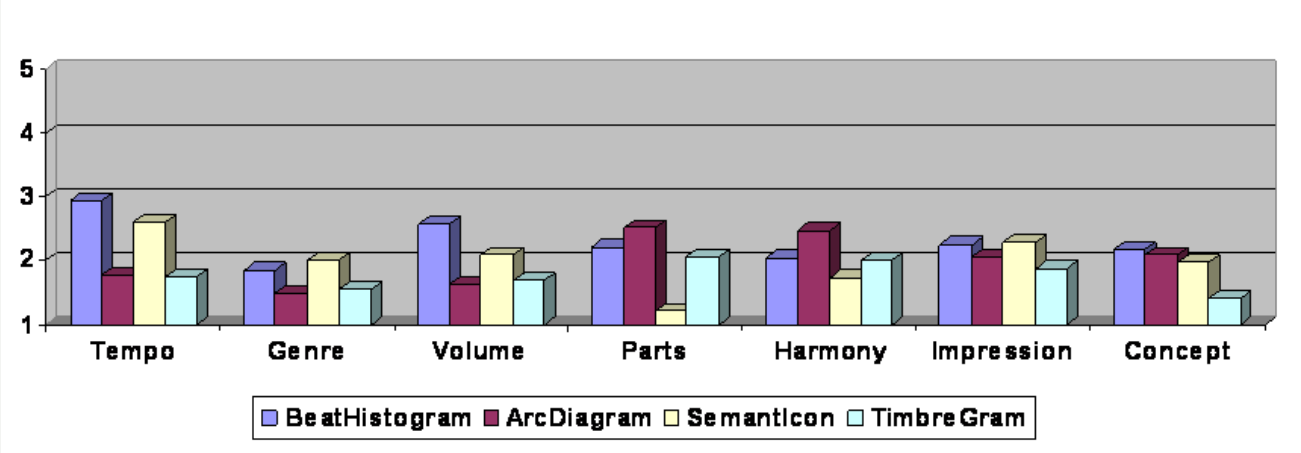
- Timbregrams (Tzanetakis, Essl and Cook, 2000) - Semanticons (Kolhoff et al., 2006)

Initial Concepts & Online survey with normal music listeners

- Goal: How useful are these visualizations ?
- Procedure: Comparison of these four concepts

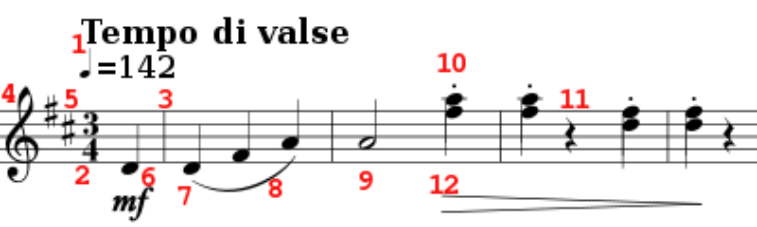


- Result: Not suitable for normal music listeners

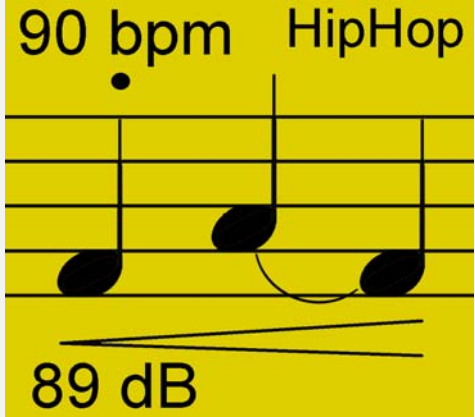


Concept Refinement & Expert Interviews

- Concept: Notesheet Metaphor
 - Overall Attributes: Volume and Aggressiveness
 - Dynamic:
 - Change in Volume: Crescendo (<) Decrescendo (>)
 - Change in Aggressiveness:
 - Legato-Arc (soft transition)
 - Staccato Points (hard breaks)



(<http://wikipedia.com>)



Concept Refinement & Expert Interviews

- Disc Jockey Interviews (real users)

Open discussion:

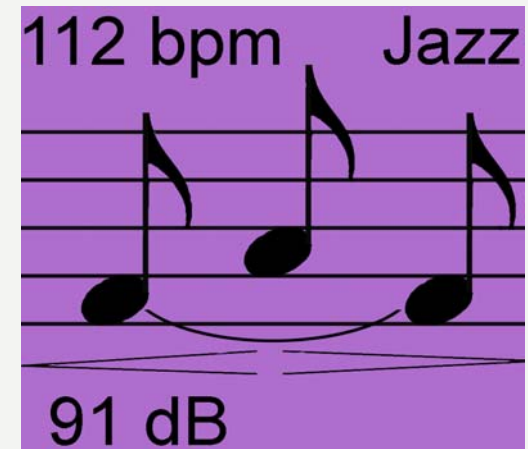
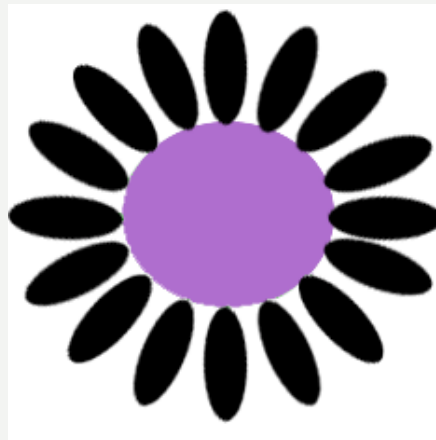
- DJ's routine Tasks
- Desired attributes
- Visualization concepts for songs and collections



ThemeRiver, TensionDiagram, SemantIcon, NoteSheet

Concept Refinement & Expert Interviews

- iStockphoto Interviews (not real users, but experienced)
 - Scenario: Find proper music for a specific purpose (coffee commercial)
 - Results: Visualization can enhance existing features (sorting, filtering)





Concept Refinement & Expert Interviews

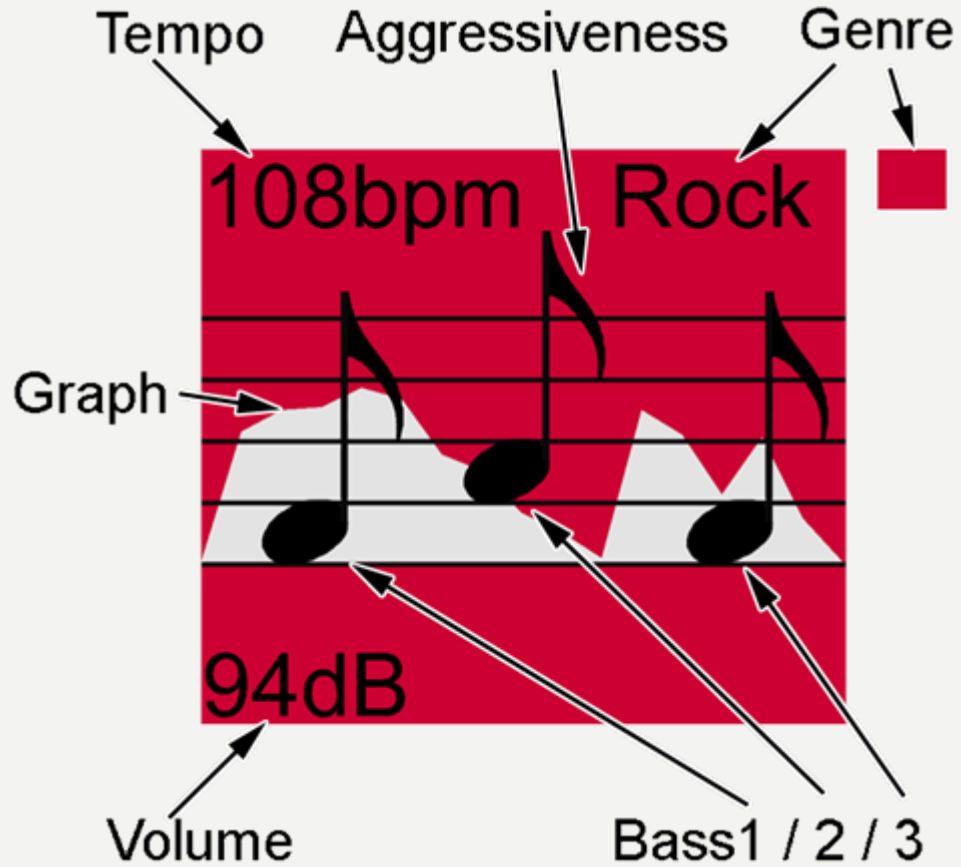
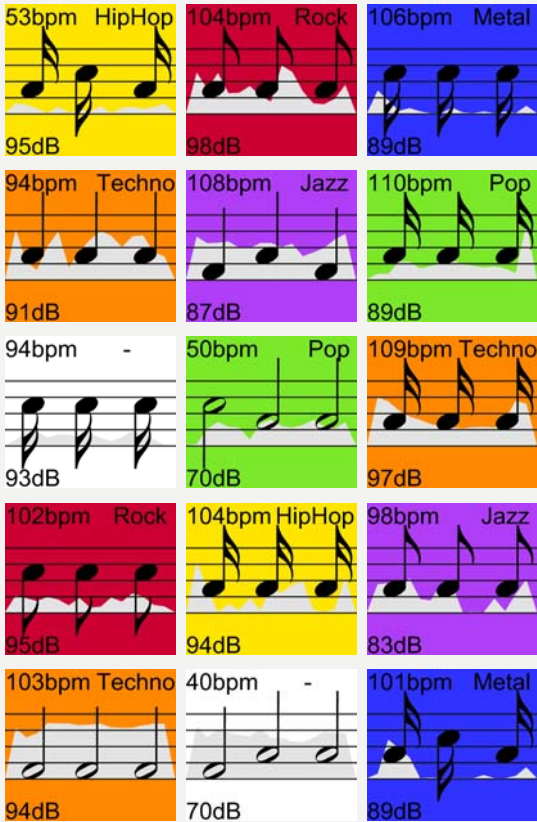
- Results:

Two different types of DJs:

- DJs playing only one / certain genres:
Prefer visualization with continuous data (TensionDiagram, ThemeRiver)
For: Detailed information
The flow and outstanding sections (gaps, peaks)
- DJs playing diverse genres:
Prefer visualization with discrete data
For: Overall information of a song
Fast impression

Attributes: Aggressiveness, Tempo, Volume, Bass, (VocalParts)

Final concept: Thumbnail

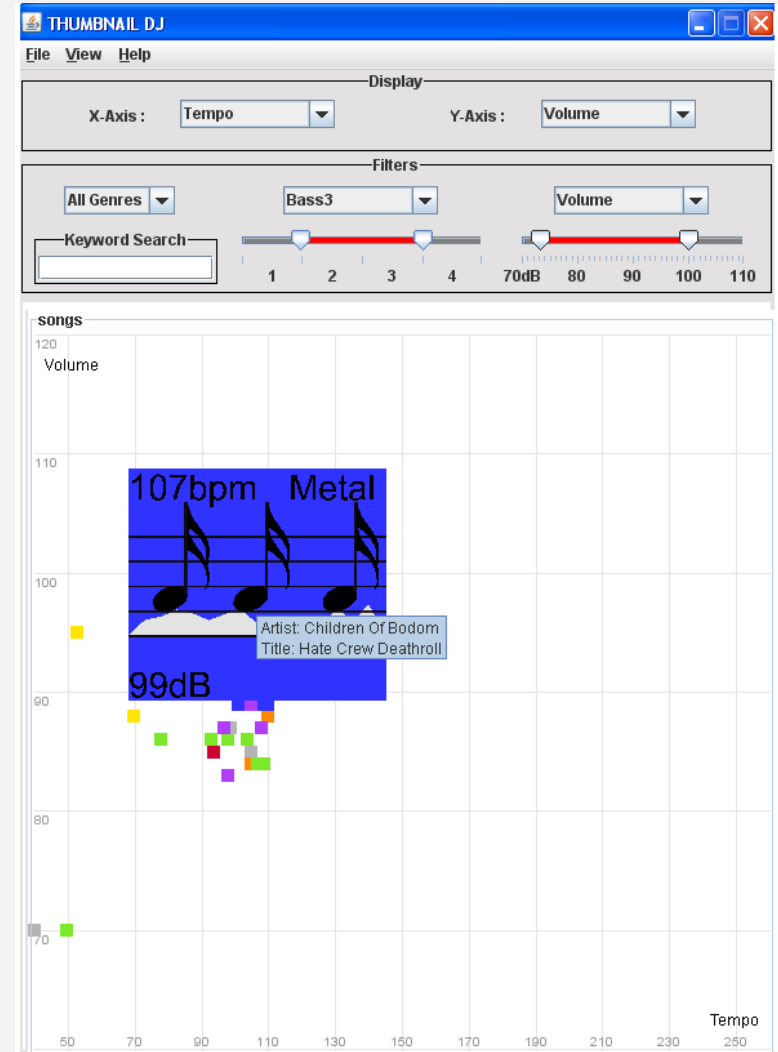




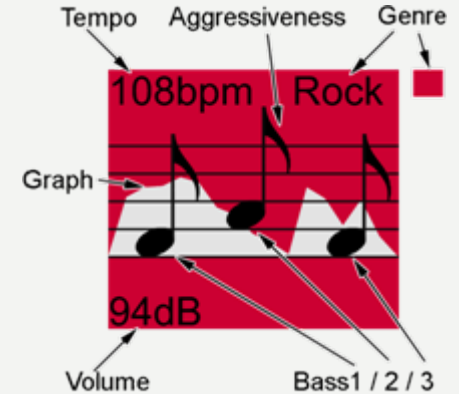
Final concept: Interface

- MenuBar
- DisplayPanel
- FilterPanel
- CollectionPanel

ThumbnailDJ



Implementation-Thumbnail:



- Aggressiveness: duration of note: 1/2, 1/4, 1/8, 1/16
Zero Crossings (ZC)
- Bass: note height, **FFT Magnitude Spectrum**
- Tempo: **Strongest Beat**
- Volume: **Root Mean Square (RMS)**
- Graph: **Zero Crossings** from 15 snippets
17 (x/y) points define flow of graph + 1 point (x/y) for baseline.



Implementation-ThumbnailDJ

- Skeletal Structure: Java Standard Edition
- Interface: Java Swing
- Background: SQLite Database
- Algorithms: Embedded jAudio + mp3splt
- Collection: Prefuse

Evaluation:

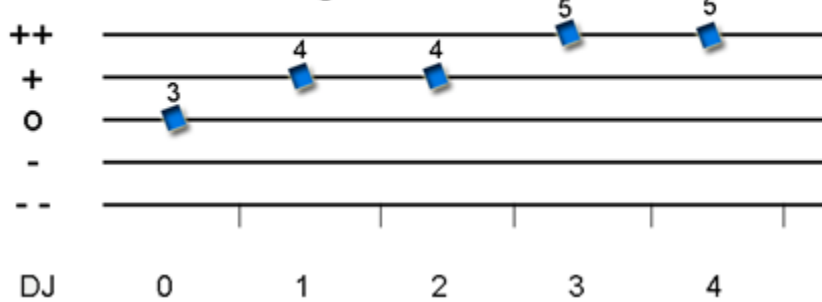
- Participants: 5 Participants, all part-time DJs,
2 Analogue/digital, 3 digital
~ 10 years experience
- Goal: Usefulness as supplement for participants' current method
- Procedure: 1. Semi-controlled interview
2. Questionnaire



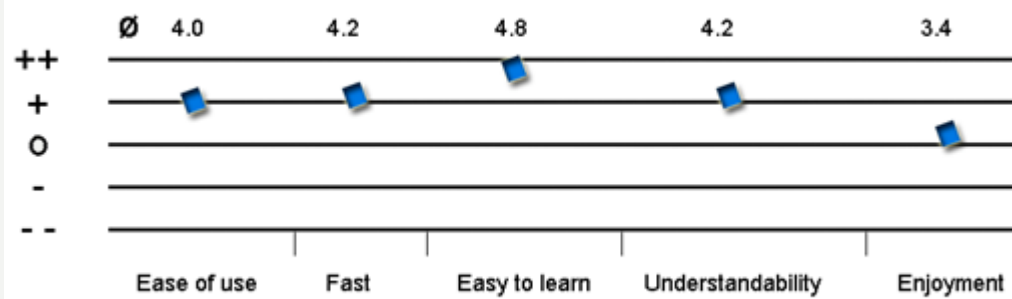


Results:

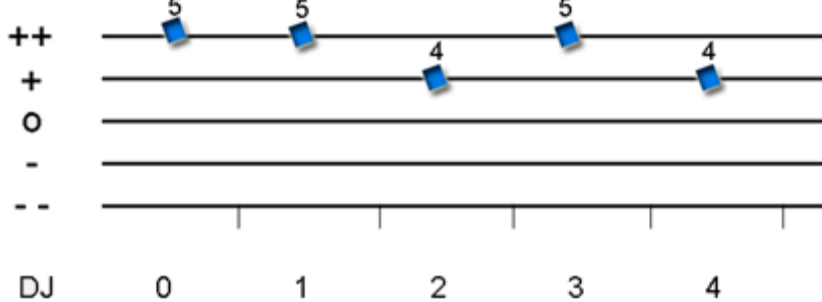
What is your opinion of the overall concept of visualising thumbnails for music



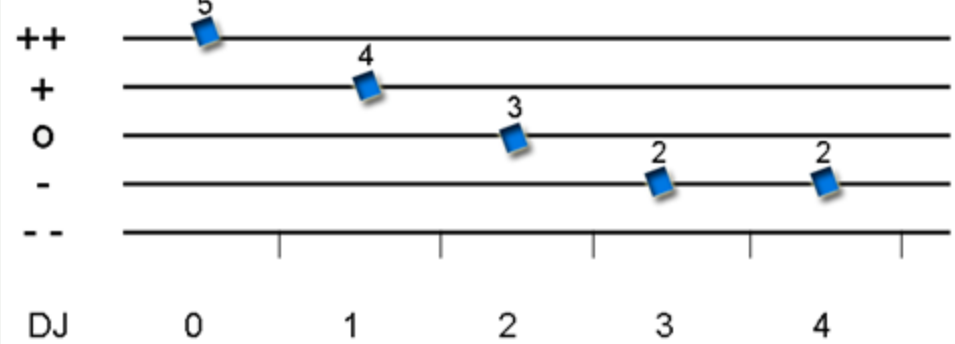
What is your overall impression of the Software ?



Would u like TNDJ being integrated to your DJ software?



Do you think general music listeners would use it ?





Conclusion & Future Work:

- Elicitation of user requirements based on interviews and online survey
- Proposal of the notesheet metaphor and ThumbnailDJ
- Improvement of algorithms (Tempo, Volume)
- Visualization of collection
- Improvement of evaluation:
 - Embed ThumbnailDJ into DJ Software
 - Observe Users in real working environment



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- O. Hilliges, P. Holzer, R. Klüber, and A. Butz.
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Questions and Discussion

