Music Understanding, Music Semantics, and the Future of Music

ICSC, September 2010

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Imagine the Musical Future

- **Computers recommend music (OK, it's done!)**
- **Music is "unfrozen":**
  - Computers generate music to meet our needs
  - Computers perform music with us

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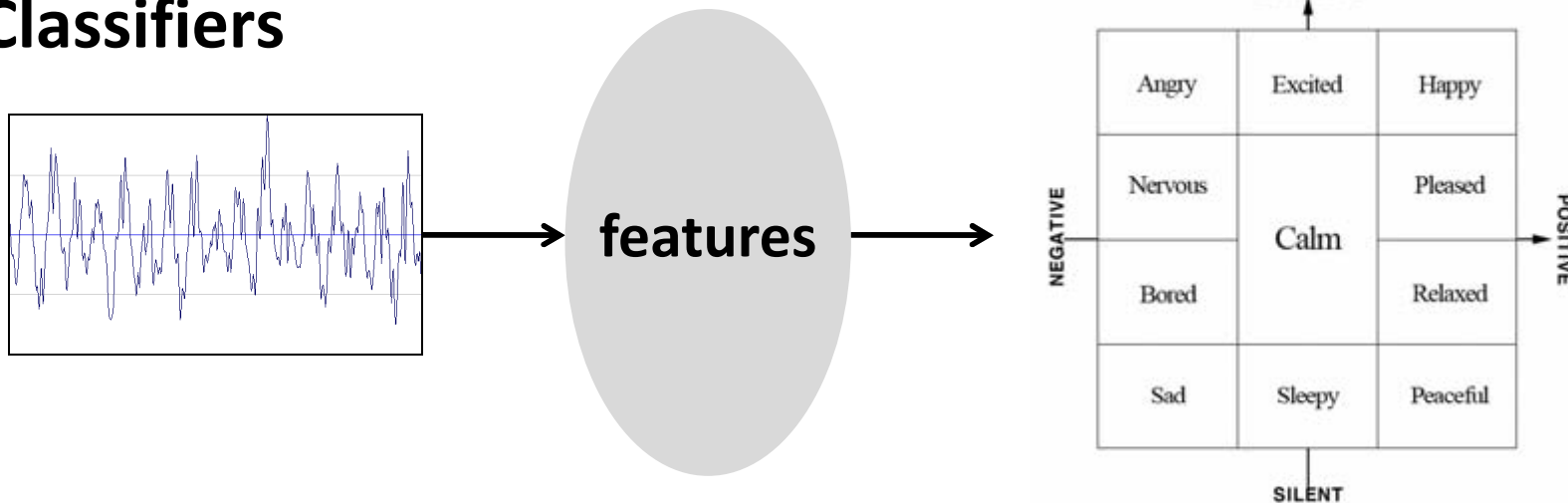
Music Understanding

- **Recognition of pattern and structure in music**
- **Surface structure:**
  - Pitch
  - Rhythm
  - Timbre
- **Deep structure:**
  - Style
  - Emotion
  - Form

Music Semantics (?)

- *A common view:* **Music is abstract structured sound with no "meaning"**
- *A broader view:* **Music exists in a web of connections to:**
  - Emotion
  - Style / Genre / Nationality
  - Function / Occasion
  - Tags
  - Similarity / Alternate Versions / Multiple Performances
- **How can we use Music Understanding and notions of Semantics?**

Emotion

- ## Classifiers
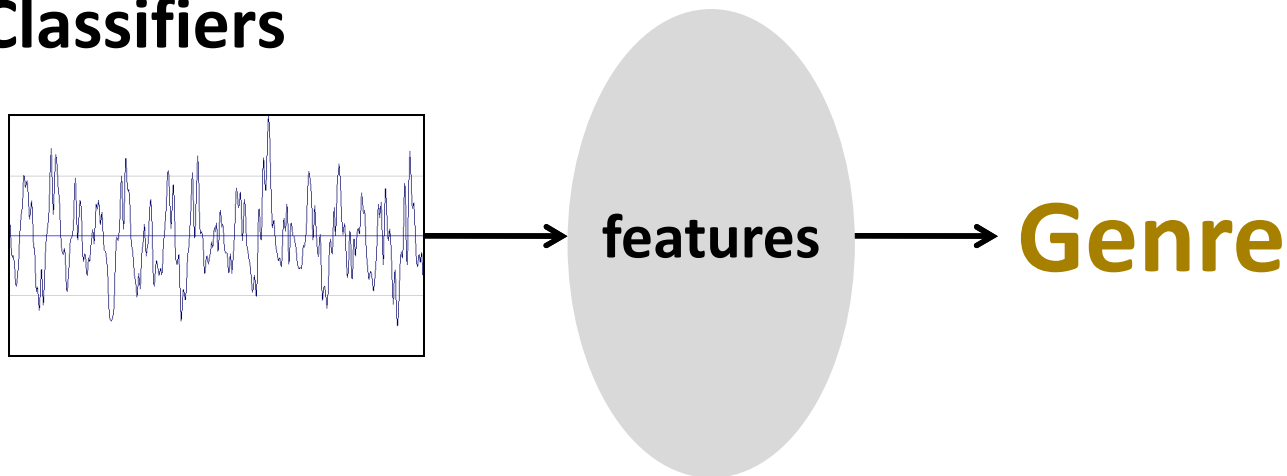

ISMIR 2009, 95% accuracy (with Han, Rho, & Hwang)

Emotion Space

- ## Generators (Roberto Bresin)

Style / Genre / Nationality

■ **Classifiers**

features → **Genre**

~65% accuracy on 10 classes

Tags and Recommendation

**Example:
Lastfm**

00s 60s 70s 80s 90s acoustic albums i own alternative alternative metal

alternative rock ambient american anime atmospheric avant-garde awesome beautiful black
metal blues blues rock british britpop brutal death metal canadian celtic chill chillout christian christmas classic
classic rock classical comedy cool country cover dance dark ambient darkwave death metal
deathcore deutsch disco doom metal downtempo drum and bass dub easy listening ebm electro
electronic electronica emo experimental favorite favorites favourite favourites female
female vocalist female vocalists finnish folk folk metal folk rock french fun funk german
gothic gothic metal gothic rock grindcore grunge guitar hard rock hardcore heard on pandora heavy
metal hip hop hip-hop house idm indie indie pop indie rock industrial industrial metal
instrumental j-pop j-rock japanese jazz jpop latin lounge love male vocalists melancholy mellow
melodic death metal metal metalcore minimal new age new wave noise nu metal oldies piano polish
pop pop punk pop rock post-hardcore post-punk post-rock power metal progressive progressive metal
progressive rock psychedelic psychedelic rock psytrance punk punk rock rap reggae rnb
rock romantic russian sad screamo seen live sexy shoegaze singer-
songwriter ska soul soundtrack stoner rock swedish symphonic metal synthpop techno thrash
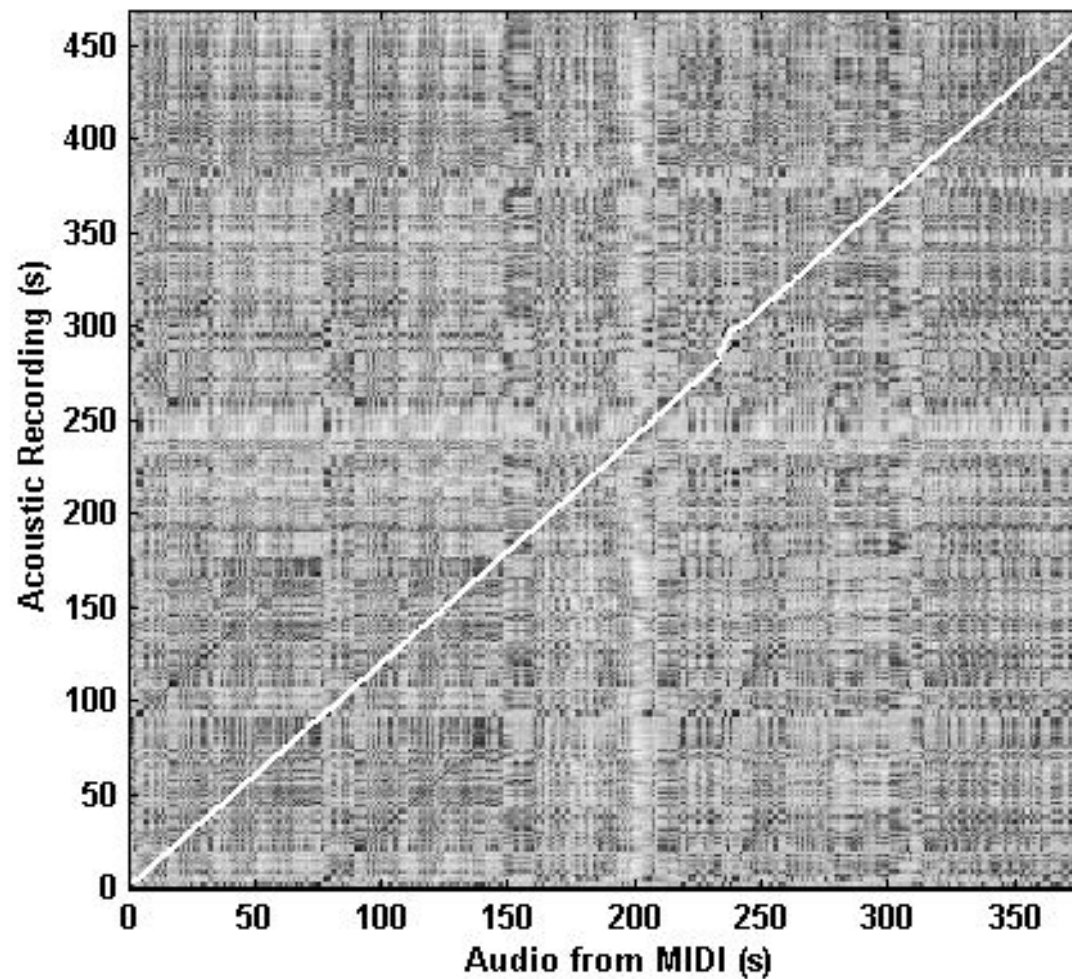metal trance trip-hop world

Tag/Artist Cloud (Anthony Liekens, Lastfm data)

Similarity

■ **Based on audio features, tags, playlists**
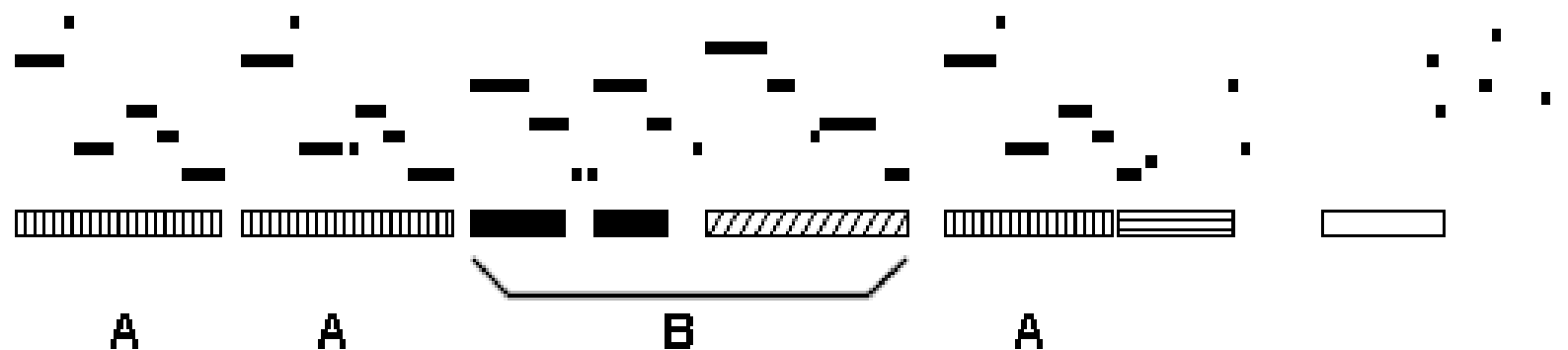
■ **Sequence Alignment techniques**

(insert Audacity demo here)

Music Alignment

Music Structure Discovery

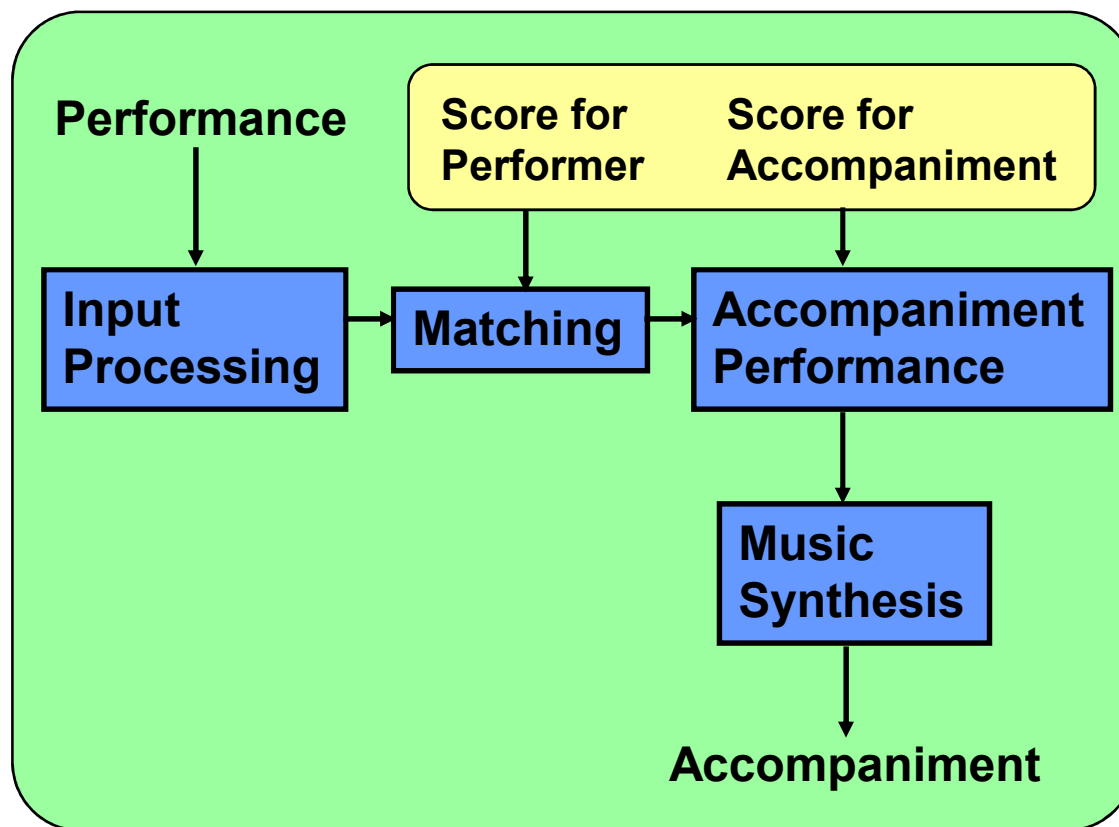A   A   B   A

The Future of Music

■ **What can we do with these techniques and representations?**

■ **Computer Composition**

  ■ Video Games

  ■ Film Scores

  ■ Music to exercise by (?) Dance to (?)

Accompaniment Video

Computer Accompaniment

Conclusion

- **Music Understanding and Semantic Representations will help us to:**
  - Find music we want to listen to
  - Create music according to need
  - Perform music with us
- **This is a rich area for research**