

Symbolic Musical Analysis

CS 275B/Music 254

Practicalities

Course context

- ▶ Music 253: Symbolic Musical Data

- ▶ How to **encode** musical data sets
 - ▶ Notation
 - ▶ MIDI/sound
 - ▶ Logical content

- ▶ Music 254 Symbolic Music Analysis

(Music Query, Analysis, and Style Simulation)

- ▶ How to **decode** musical data sets
 - ▶ **Query** = data **extraction**
 - ▶ **Analysis** = data **evaluation**
 - ▶ **Style simulation** = data **assessment and manipulation**

Elements of the course

► Samples:

- **Query:** *Themefinder* (melody)
- **Analysis:** *Humdrum* (harmony, rhythm, melody)
- **Style simulation:**

Humdrum (involves integration of other operations)

Project part:

(a) literature/site survey



(b) tool/software development

(3) presentation and write-up

Topic schedule

▶ Musical topics:

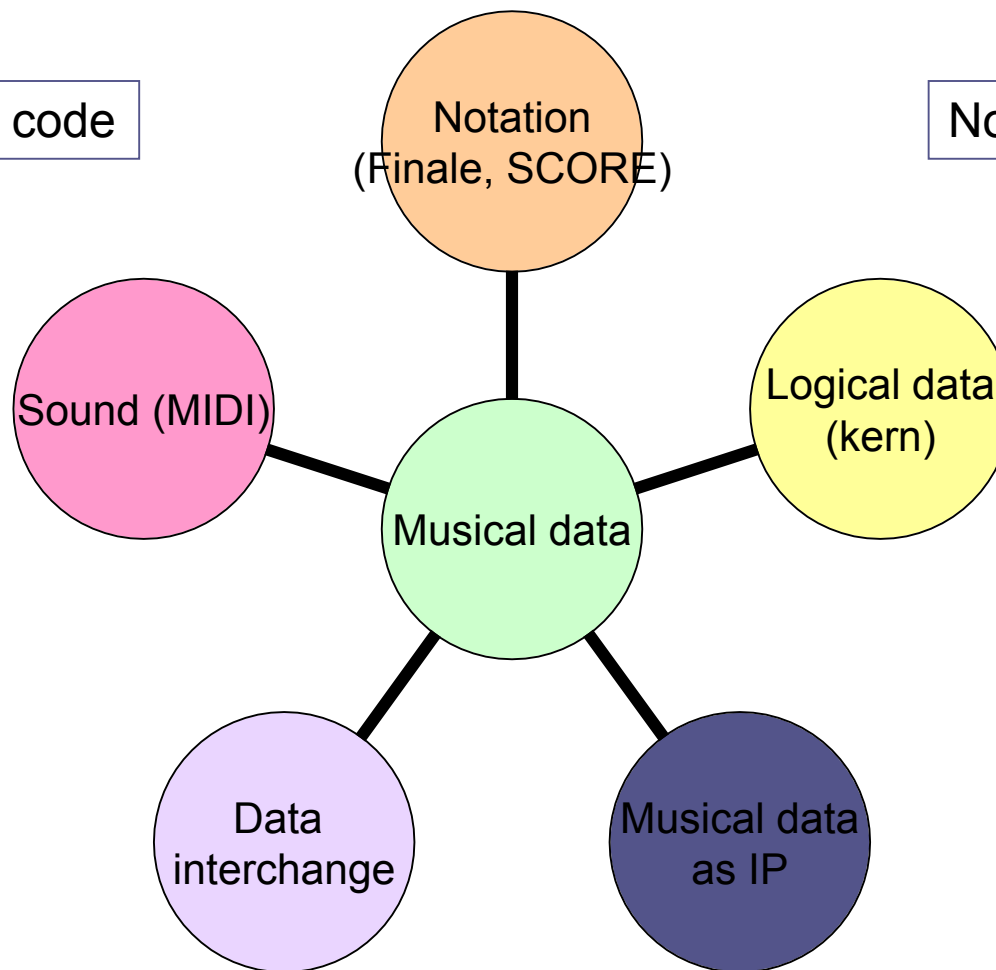
- ▶ Week 2 Melody; data sources; similarity
- ▶ Week 3 Harmony; current work
- ▶ Week 4 Rhythm; current work

▶ Methodological topics (vary from year to year):

- ▶ Week 5
- ▶ Week 6
- ▶ Week 7
- ▶ Week 8

Contexts and resources

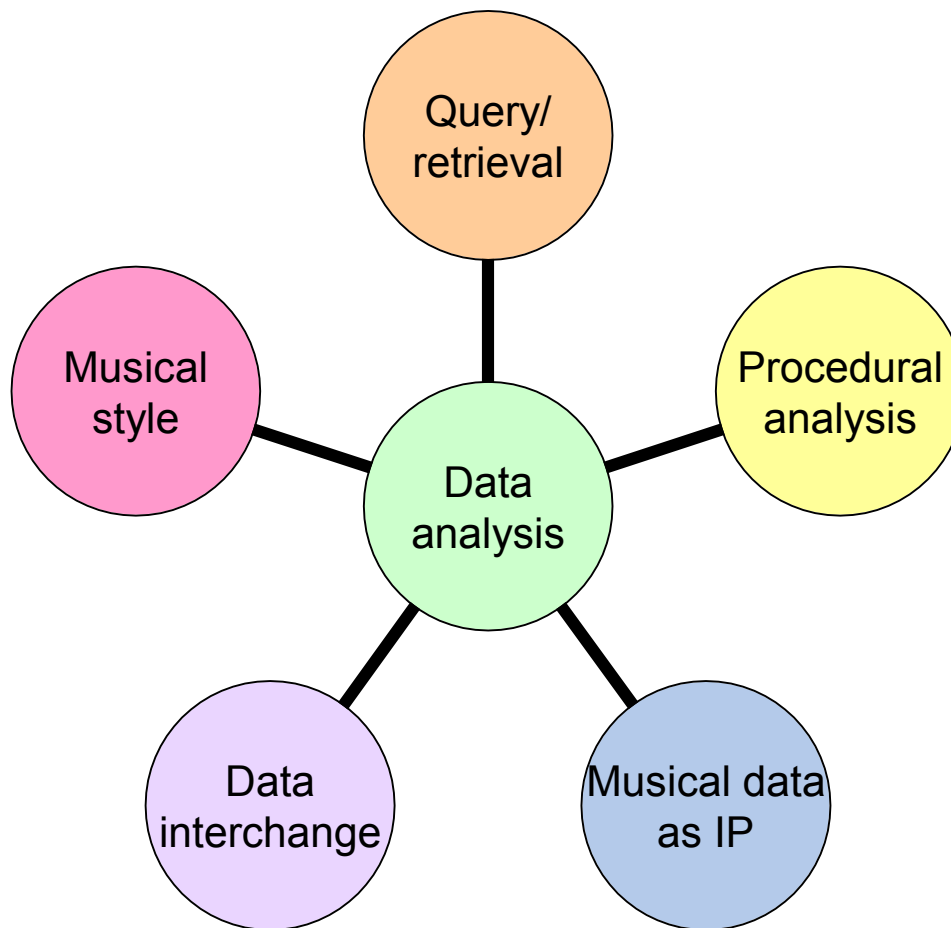
Symbolic Musical Information Scheme



No universal code

No universal translator

Symbolic Musical Analysis Scheme



Data resources at CCARH

► Monophonic only

- Essen database (folk music)
- *Themefinder* repertories

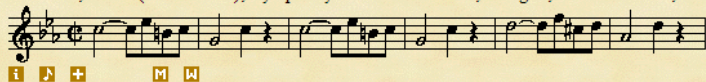
► Polyphonic

- *KernScores* (keyboard)
- *MuseData* (chamber, orchestral)

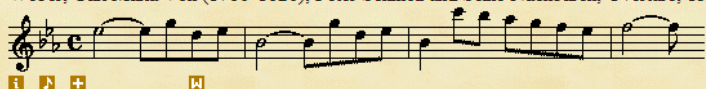
1. Beethoven, Ludwig Van (1770-1827), Trio in B Flat, Op. 97, Vn., Cello & Pft. "Archduke", 1st Movement, 1st Theme



2. Schubert, Franz (1797-1828), Symphony No. 4 in C Minor, "Tragic", 4th Movement, 1st Theme



3. Weber, Carl Maria Von (1786-1826), Peter Schmöll und Seine Nachbarn, Overture, 1st Theme



Kern Scores

A library of virtual musical scores in the Humdrum ****kern** data format.
Total holdings: 7,866,496 notes in 108,703 files.

search:
[browse](#) | [shortcuts](#) ☐ anchored

[A guided tour of the KernScores website](#)
[Recent additions to the KernScores library](#)
[Data Collection Highlights](#)

[Online Humdrum Editor](#)
[CCARH Humdrum Portal](#)
[Contribute kern scores](#)

Query (Retrieval) via Themefinder

Search form

Repertory	<input type="text" value="ALL"/>	<input type="checkbox"/> type of music to search
Pitch	<input type="text"/>	<input type="checkbox"/> A-G, sharp=#, flat=- e.g. C E- G F#
Interval	<input type="text"/>	<input type="checkbox"/> maj=M, min=m, aug=A, dim=d per=P, fifth=5, up=+, down=-. e.g. +m9 -P8 +M3 P1
Scale Degree	<input type="text" value="13715"/>	<input type="checkbox"/> do=1, re=2, mi=3, fa=4, so=5, la=6, ti=7 (mode insensitive). e.g. 34554321
Gross Contour	<input type="text"/>	<input type="checkbox"/> up=/, down=\, unison=-. e.g. //\-/ or uudsu
Refined Contour	<input type="text"/>	<input type="checkbox"/> up step=u, up leap=U, down step=d, down leap=D, same=s. e.g. uUDsdu
Location	<input checked="" type="radio"/> beginning of theme only, or <input type="radio"/> anywhere in theme	<input type="checkbox"/>
Key	Any <input type="text"/> Mode: Any <input type="text"/>	<input type="checkbox"/>
Meter	<input type="text"/> / <input type="text"/>	<input type="checkbox"/>
<input type="button" value="Submit Search"/>		

1. Beethoven, Ludwig Van (1770-1827), Trio in B Flat, Op. 97, Vn., Cello & Pft. "Archduke", 1st Movement, 1st Theme

2. Schubert, Franz (1797-1828), Symphony No. 4 in C Minor, "Tragic", 4th Movement, 1st Theme

3. Weber, Carl Maria Von (1786-1826), Peter Schmolli und Seine Nachbarn, Overture, 1st Theme


Responses

Meta-data vs Semantic searching

Generic objects

- fruit
- jars
- cloths



Ambiguities

Specific objects

- peaches
- vase
- apricot



Basic colors

- blue
- green
- white



Categories

Intermediation

Gradations

Specific colors

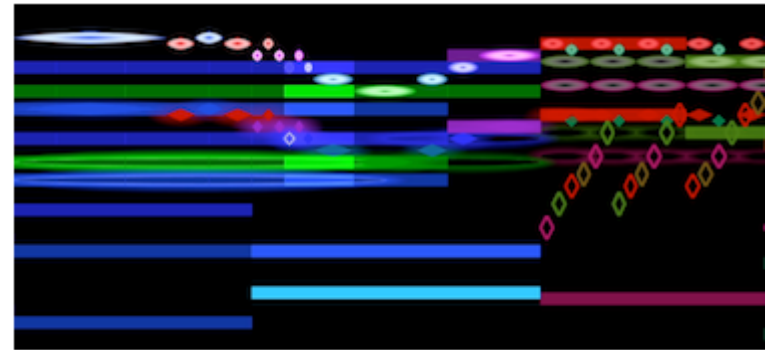
- teal (blue)
- forest (green)
- off-white

Major areas of music analysis

Feature extraction and analysis

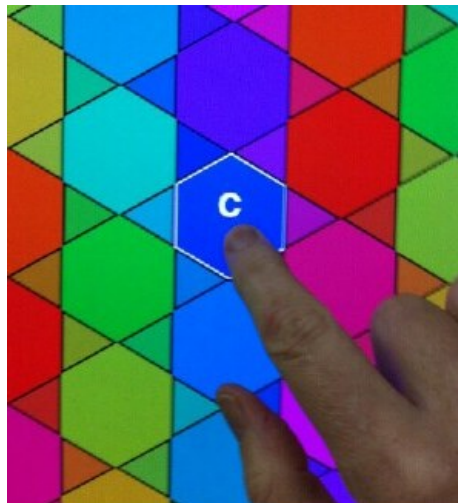


Voices, textures

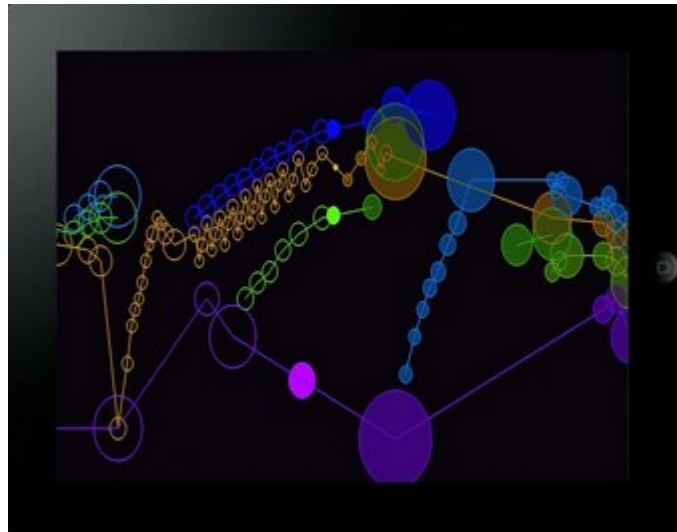


Articulation, dynamics

From the work of
Steven
Malinowski

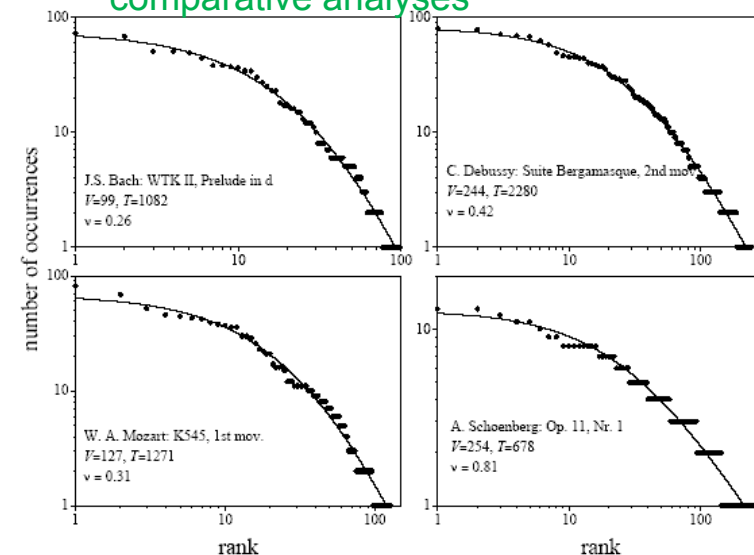
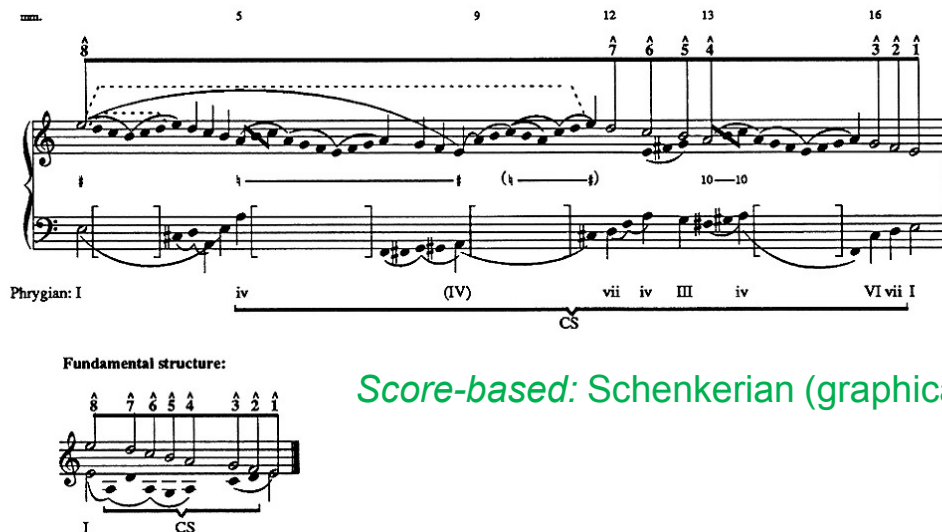
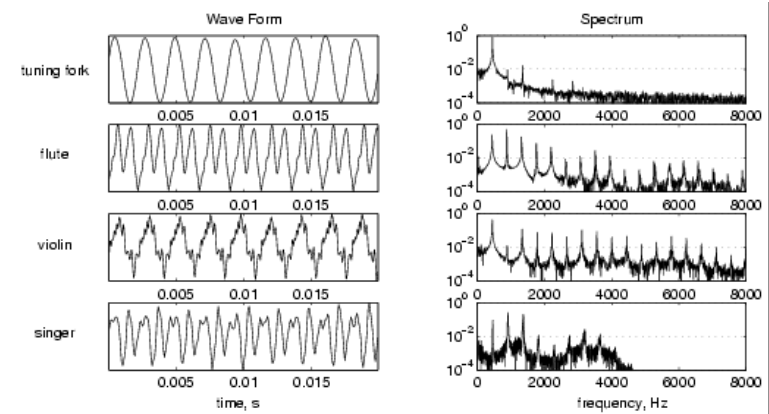


Tonal relations



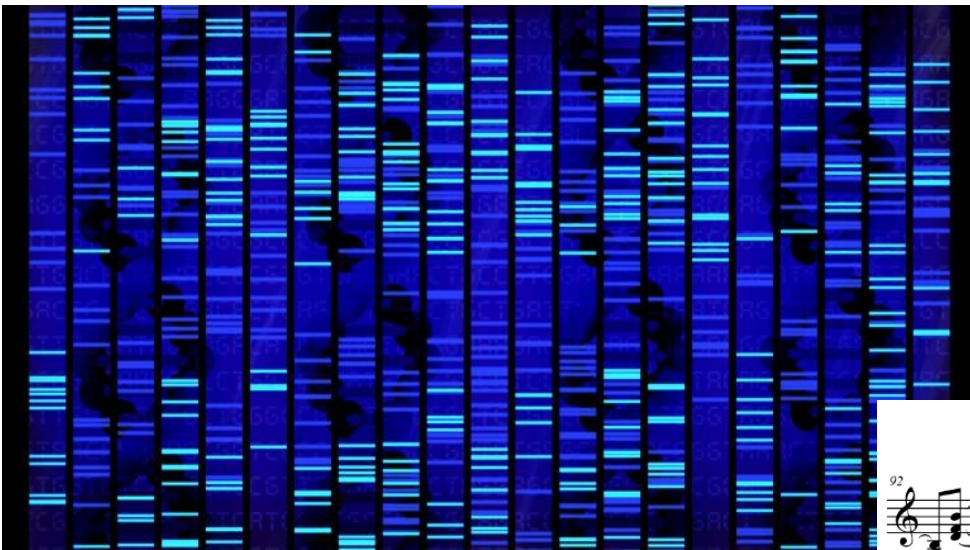
Off the grid

Musical style (analysis)



DNA-sequencing algorithms

Dang Vu: feature propagation in
improvised Vietnamese chamber music
(adaptation of genetic analysis sw)



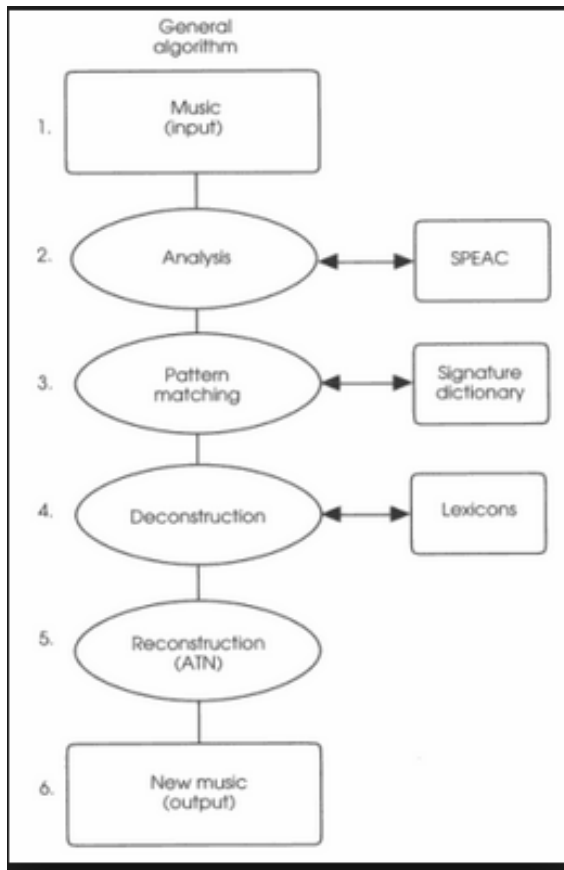
Horse hemoglobin > music
(Gene2Music, UCLA)



3

Musical style (simulation)

Work of David Cope (UCSC)



Virtual Rachmaninoff
Music by David Cope
with Experiments in Musical Intelligence



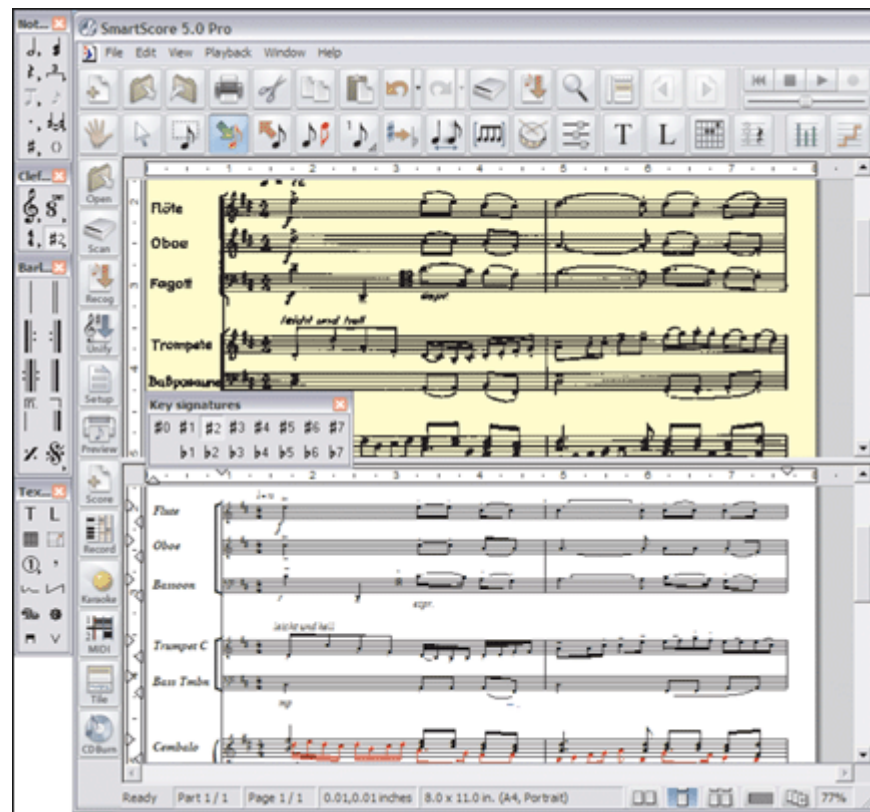
Data interchange

► CS 275A

- MusicXML
- MEI (in progress)
- MIDI (common default)

(Data supply)

► CS 275B (if relevant)



Other possible areas of study

- ▶ Procedural analysis
- ▶ Structural analysis
- ▶ Style/feature clusters
- ▶ Methods from other disciplines
 - ▶ Linguistics
 - ▶ Mathematics
 - ▶ Psychology/cognition
 - ▶ Information theory
- ▶ New representations
 - ▶ Non-Western music
 - ▶ Pre-tonal music
 - ▶ Post-tonal music
- ▶ Audio/symbolic linking