Input of musical notation

Music 253/CS 275A Stanford University

Possible sources of musical input

- Sound
- Graphics construction
- Symbolic data entry
- Optical recognition
- Hybrid systems

Sound transcriptions methods (1930)

- 1. Symbolic data entry
- 2. Graphics assembly
- 3. Sound capture
- 4. Optical recognition
- 5. Combination systems

How can we make sound tangible?



Sonogram (Carl Seashore et al., since *c*. 1930)

Calculation methods

- 1. Symbolic data entry
- 2. Graphics assembly
- 3. Sound capture
- 4. Optical recognition



CHM first Sat 2p

Babbage Difference Engine,

Analytical Engine--CHM reconstruction (2008) https://www.youtube.com/watch?v=KBuJqUfO4-w

What can these machines process?



Babbage analytical engine (1849)

Samson box (for "audio computation" c. 1975-80)





Gareth Loy's full article (2013) at: http://www.mitpressjournals.org/doi/pdf/10.1162/COMJ a 00193

Alex Di Nunzio, "Samson Box," http://www.musicainformatica.org/topics/samson-box.php

Input methods (1984)

- 1. Symbolic data entry
- 2. Graphics assembly
- 3. Sound capture
- 4. Optical recognition





Lisa 1 (1984)

Apple Graphics & Sound: Brian Howard, Jef Raskin

How can this be processed?

DARMS Pioneers

Stefan Bauer-Mengelberg (1927-1996)

- IBM mathematician; developer
- Assistant conductor (to Leonard Bernstein)
- Implemented system for making a computer transcribe a composition (by Stefan Volpe)
- Edited papers of Gödel (Escher, Bach)
- IP lawyer

Jef Raskin (1942-2005)

- Apple #4
- **co-dev** (with Brian Howard, Apple #32)
- of Apple G&S (forerunner of *QuickTime*)
- Developed original Mac interface
- Composer
- First person to implement DARMS
 (1966)
 Encoding music







Raskin system, 1967

Symbolic codes for music

1965-1985: hand encoding (type keyboard)

- **DARMS** (Digital Alternate Rep. of Music Scores)
- MUSTRAN, IML-MIR et al.



("Great Society" encoding scheme)

- Designed for mainframes, card-readers
- Few printing possibilities
- Important for
 - the **thinking** that went into the task
 - documentation
 - Implementation (school music, esoteric repertories)

Ancestors of computer typesetting of music (1955-75)

Leuning, Ussachefsky et al.

Columbia-Princeton tape-music collaboration (from 1954)



Leland Smith (SCORE, 1974-2013) Prof. of composition J. McCarthy Stanford AI lab — P7 = 11 P10 P11 P12 P13 P14 P15 11 56 -1 21 70 -1 12 35 42 21 56 ... Smith

Cheerleaders for hand encoding



2. MIDI-assisted era (1985-2005)

Machine and hand input

- point and click palettes (graphic assembly with mouse)
- Many problems with MIDI timing resolution
- Cross-hatched systems (part MIDI, part hand)

Printing options kept changing

- 1970s: plotters (SCORE)
- 1980s: **dot-matrix** printers (MuseData)
- ____1990s: laser printers, PostScript
- 1985-2005: high-end phototypesetting shops





Conceptions from the phonograph

- Edison (from 1889, but not initially musical)
- Transcription tools (graphics)
- Recording horns (sound)
- Video capture



Edison's recording violin

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Amberol (1877)



Synchronization (?)



Turntable for altering light/shadow

Films were "narrated" by live music (piano, organ) until 1930s

Film and audio were not synchronized until *c*. 1946.

Edison's Black Maria (1892-1910)

See https://en.wikipedia.org/wiki/Kinetoscope#/media/File:Hapci-fr.gif

Edison recording studio (1905)

http://www.tinfoil.com/record.htm

West Orange, NJ



MAKING & EAND RECORD, WITH THIRTEEN RECORDING HOR

Setup for band recording



Reproducing music: Early recording technology



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