OMax
Improvisation & Synchronisation(s)

Synchron’11, November 29th 2011

Benjamin Lévy, Jean-Brice Godet
Overview

• Max/MSP

• OMax
  ‣ Origins & Examples
  ‣ Architecture
  ‣ Factor Oracle

• Perspectives
  ‣ Cadence / Stopping
  ‣ Rhythm / Beat
  ‣ Multi Model / Temporality / Listening
OMax: Origins

• Style Modelling
• Factor Oracle
• Off Line Generation
• Interactive
• Audio Oracle
• Video Sync
Examples
Off Line MIDI

J.S. Bach
Off Line MIDI

Bernard Lubat
Off Line MIDI

Jaco Pastorius
On Line Polyphonic MIDI

Helene Schwarz, May 2007
Architecture
OMax Structure

Input → Detection → Segmentation → Modelling → Generation → Rendering → Output

Learning → Improvising
OMax Functions

Input → Detection → Segmentation → Record

Buffer

Modelling

Controls → Improviser → Scheduler → Renderer → Output

Interface
OMax Modules

Input → Extraction → Segmentation & TimeStamp → Oracle & Data → Impro → Player → Output

Buffer & Transport → Oracle & Data

Graph → Display

ImprovVisu
Factor Oracle
Factor Oracle: Building

Allauzen & Crochemore 1999

abbbaab

aba
**Factor Oracle: Building**

Allauzen & Crochemore 1999

---

**Function add_letter(Oracle(p = p_1p_2...p_m), \( \sigma \))**

1. Create a new state \( m + 1 \)
2. Create a new transition from \( m \) to \( m + 1 \) labeled by \( \sigma \)
3. \( k \leftarrow S_p(m) \)
4. While \( k > -1 \) and there is no transition from \( k \) by \( \sigma \) Do
5. 
   Create a new transition from \( k \) to \( m + 1 \) by \( \sigma \)
6. 
   \( k \leftarrow S_p(k) \)
7. End While
8. If \( (k = -1) \) Then \( s \leftarrow 0 \)
9. Else \( s \leftarrow \) where leads the transition from \( k \) by \( \sigma \).
10. \( S_p(m + 1) \leftarrow s \)
11. Return Oracle(\( p = p_1p_2...p_m\sigma \))

**Figure 4.** Add a letter \( \sigma \) to Oracle(\( p = p_1p_2...p_m \)) to get Oracle(\( p\sigma \))
Factor Oracle: SLT

Suffix Length Trees
Factor Oracle: Navigation
Assayag & Bloch 2007
Improvisation: Pitch

- State
  - SLT
    - Regions
      - Bound?
        - Taboo
    - Selection
      - GUI
- GUI
  - Attractor
    - Velocity
    - Rhythm
    - Octave
  - Descriptors
    - Weight
      - Probability
        - Event
          - Jump
          - Quality
Improvisation: Spectral
Perspectives
Timing

- Stoping
- Cadences
- Beat
- Rhythm
OMax: Clustering I
Multi-Model
Multi-Temporality
Multi-Temporal Modelling

Input → Detection → Segmentation → Record → Modelling → Buffer

Improviser → Scheduler → Renderer → Output

Improviser → Scheduler → Renderer → Output

Improviser → Scheduler → Renderer → Output
Demo