Distributed Digital Music Archives and Libraries (DDMAL)

Ichiro Fujinaga
Schulich School of Music
McGill University
Research Infrastructure

- CIRMMT
  - McGill University
    - Schulich School of Music
    - Music Technology Area
    - DDMAL
CIRMMT
Centre for Interdisciplinary Research in Music Media and Technology

Six research axes:
- Sound modeling, acoustics, and signal processing
- Musical gestures, devices, and motion capture
- Musical information archiving and retrieval
- Multimodal immersive systems
- Music perception and cognition
- Expanded musical practice
CIRMMT
Centre for Interdisciplinary Research in Music Media and Technology

Schulich School of Music
- Music Technology Area
- Sound Recording Area
- Digital Composition Studio
- Music Education Area
- Music Theory Area

McGill Faculty of Science
- Department of Psychology
- School of Computer Science

McGill Faculty of Engineering
- Electrical and Computer Engineering

McGill Faculty of Medicine
- Montreal Neurological Institute

Université de Montréal
- Faculty of Music
- Faculty of Arts and Sciences (Psychology, Computer Science)
- BRAMS

Université de Sherbrooke
- Groupe d'Acoustique
McGill University
Schulich School of Music
Music Technology Area

- Professors
  - Philippe Depalle
  - Ichiro Fujinaga
  - Stephen McAdams
  - Gary Scavone
  - Marcelo Wanderley

- Post-docs (5)
- PhD students (18)
- Master’s students (7)
- Honours undergrads (7)
McGill University
Schulich School of Music
Music Technology Area

- Sound Processing and Control Laboratory (SPCL)
- Computational Acoustic Modeling Laboratory (CAML)
- Input Devices and Music Interaction Laboratory (IDMIL)
- Music Perception and Cognition Laboratory (MPCL)
- Real-Time Multimodal Laboratory (RTML)
- Distributed Digital Music Archives and Libraries Laboratory (DDMAL)
Research Projects in DDMAL
Distributed Digital Music Archives and Libraries

- **GEMM: Laurent Pugin, John Ashley Burgoyne**
  - Gamut for Early Music on Microfilms
- **jMIR: Cory McKay**
  - Java-based Music Information Retrieval tools
- **OMEN: Dan McEnnis, Andrew Hankinson**
  - On-demand Metadata Extraction Network
- **MAPP: Catherine Lai, Damon Li**
  - McGill Audio Preservation Project
    - MAQ (McGill Audio Quality laboratory)
    - MItAC (McGill Image to Audio Conversion system)
GEMM
(Gamut for Early Music on Microfilms)

- Based on GAMUT (Gamera-based Automatic Music Understanding Toolkit) & ARUSPIX
- Possibility of OMR for music on microfilms
- Almost all old Western music are on microfilms
- Efficient digitization using automatic microfilm scanner (500ppm)

Goal: Diplomatic facsimile
  - Geometrically accurate reproduction
  - Imitate fonts and handwriting style
jMIR
java-based MIR tools

- ACE (Autonomous Classifier Engine)
  - Meta learning framework
- jAudio
  - Feature extractor for audio data
- jSymbolic
  - Feature extractor for symbolic data
- jWebMiner
  - Cultural features extractor from web text
- jMusicMetaManager
  - Detect and correct erroneous metadata
On-demand Metadata Extraction Network (OMEN)

- Musical features are metadata
- Metadata (XML) much bigger than audio files
- Audio files mirrored in several locations
- Under-utilized library computers
- Common features (metadata) cached
- L2L (library-to-library) protocol: currently implemented using servlets and JavaServer Pages (JSP)
OMEN Topology

- Master Node
- Library Node
- Worker Node
McGill Audio Preservation Project (MAPP)

- Millions of LPs to be digitized
- Workflow management
- Document analysis
- Automatic metadata extraction
- Automatic track segmentation
- Recordings before 1957: Public Domain
- Pilot project: Edelberg Handel Collection
McGill Image-to-Audio Conversion (MIItAC) System
White-light Interferometry Profiling Microscope

- Lateral resolution
  - 0.1 micrometer (μm)
- Vertical resolution
  - 0.1 nanometer

$260,000!
3-Dimensional Interactive Display

Surface Stats:
Ra: 7.68 μm
Rq: 8.81 μm
Rt: 31.16 μm

Measurement Info:
Magnification: 20.60
Measurement Mode: VSI
Sampling: 475.63 nm
Array Size: 480 X 736

Title: McGill University
Note: Red LP - Maximum Modulation
The world’s slowest turntable

Time and space to scan one side of an LP

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<th>Resolution</th>
<th>Time (hours)</th>
<th>File Size (GB)</th>
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Upcoming Research

- Statistical sequential data analysis: John Ashley Burgoyne
- Pitch estimation in polyphonic vocal music to facilitate choral intonation modeling: Johanna Devaney
- Distributed name authority architecture for digital music libraries: Andrew Hankinson
- High-resolution time-frequency analysis: Jason Hockman
Introducing NEMA

- Network Environment for Music Analysis
- Mellon-funded three-year $1.2M project
- Participants
  - UIUC (Downie)
  - McGill (Fujinaga)
  - Goldsmiths (Crawford)
  - Queen Mary (Sandler)
  - South Hampton (De Roure)
  - Waikato (Bainbridge)
- Technologies: jMIR, ACE XML, OMEN,...
Acknowledgements

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McGill
Centre for Interdisciplinary Research in Music Media and Technology

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