

# Digital Music Lab

An AHRC Digital Transformations Project

## Large-Scale Analysis of Chord Sequences

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# Large-Scale Analysis of Chord Sequences

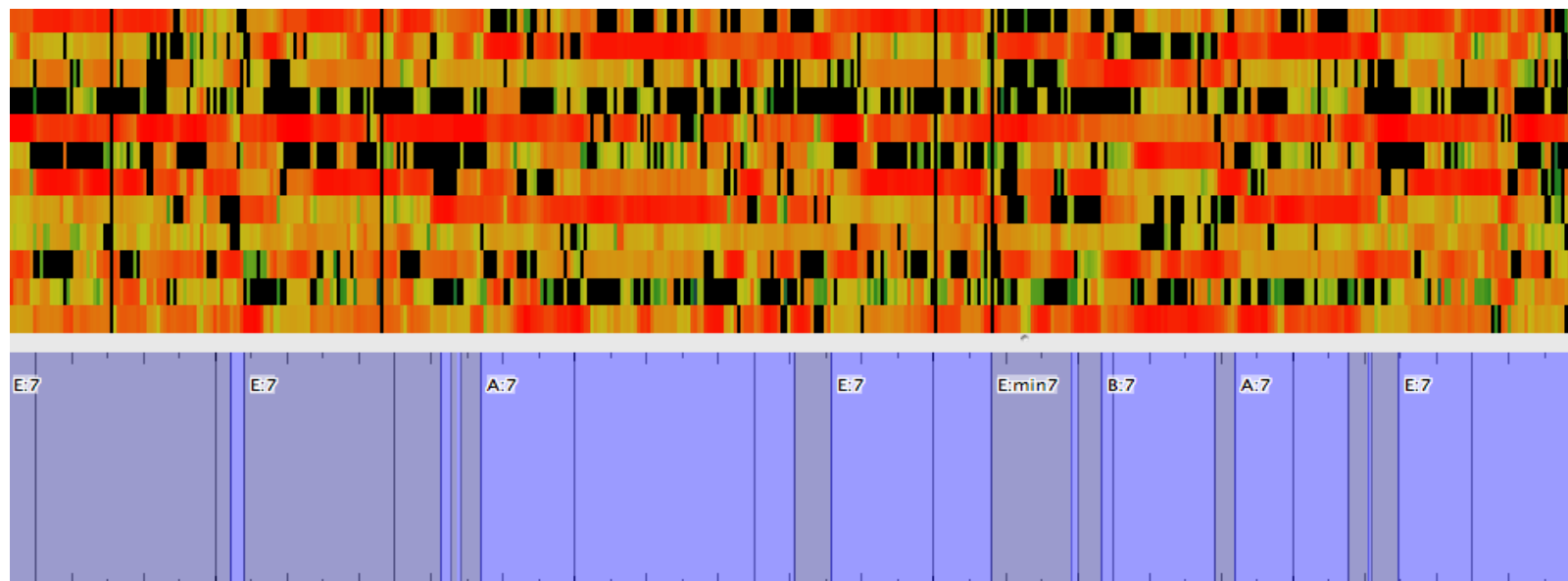
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- ▶ Extracted **chord sequences** (e.g. Am7/E7/Gmaj7, etc...)
- ▶ On ILM's commercial music collection (1m tracks )
  - ▶ **Parallel processing** of multiple music clips
  - ▶ Chordino **Vamp plugin** (Queen Mary University of London)
  - ▶ **6 weeks** on 8 core virtual machine
- ▶ Retrieve most frequent chord patterns using **Sequential Pattern Mining (SPM)**
  - ▶ In specific genre subsets (classical, folk, jazz, blues, rock, reggae)
  - ▶ Chord pattern graphs visualised with open source **graphviz**

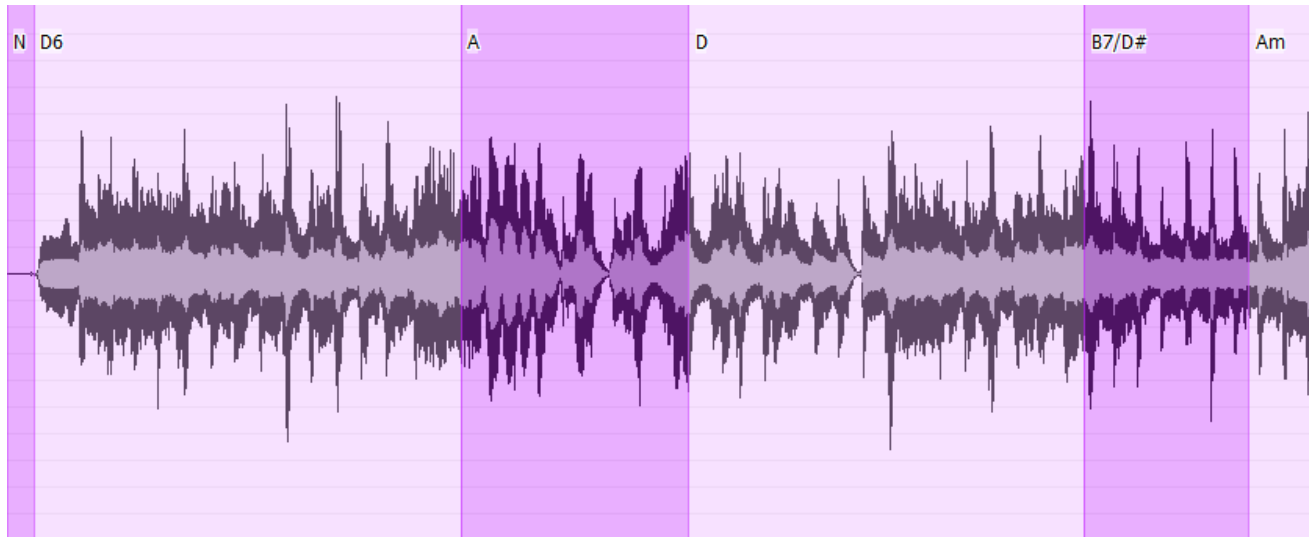
# Audio-based Automatic Chord Recognition

- **Chordino Vamp plugin** [Mauch and Dixon, ISMIR 2010].
- Uses **chromagram** obtained with a non-negative least squares (NNLS) procedure for approximate note transcription.
- **Accuracy of 80%** when assessed with MIREX 2009's dataset (Popular songs from the Beatles and Queen).

*Excerpt from Buddy Guy's Mary Had A Little Lamb*



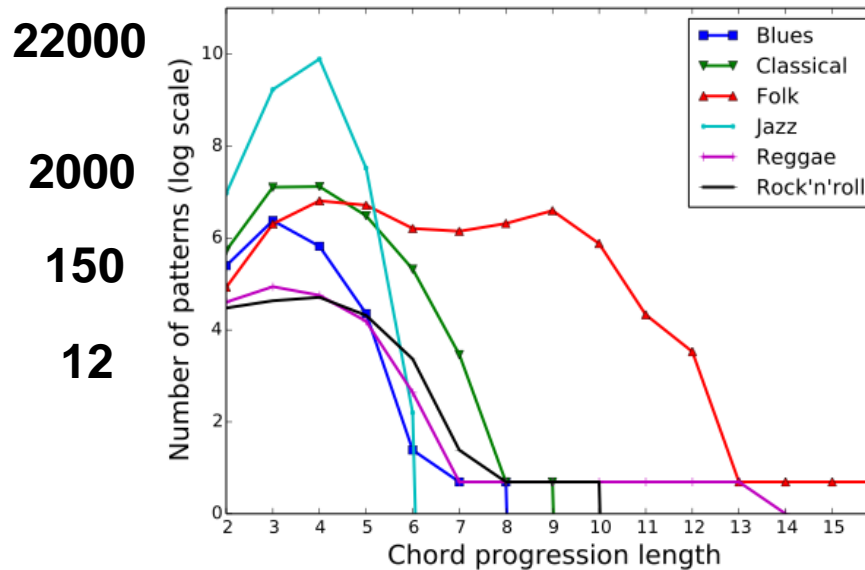
# Chord Sequence Patterns



- ▶ Segmentation of audio recordings into chord sequences
- ▶ Representation of no detection (N)
- ▶ Most frequency of (non-contiguous) chord sequences are patterns



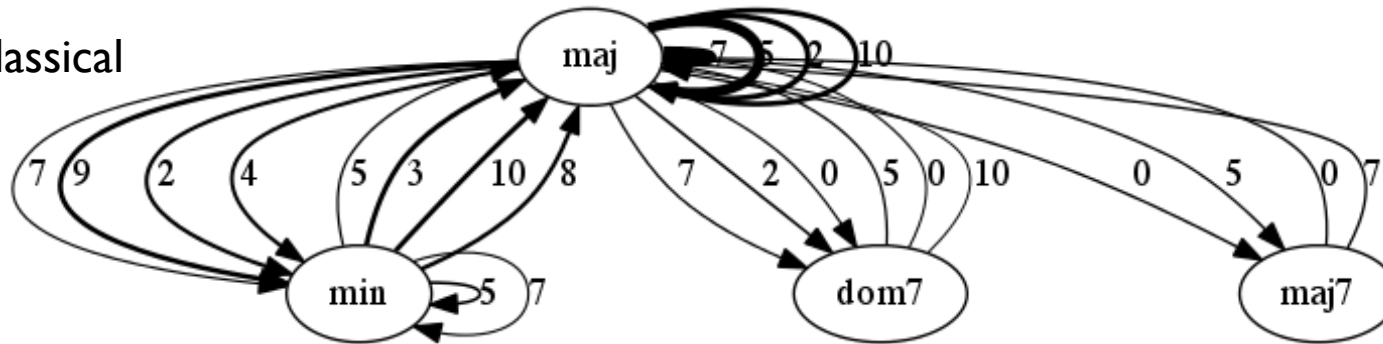
# Chord Pattern Length



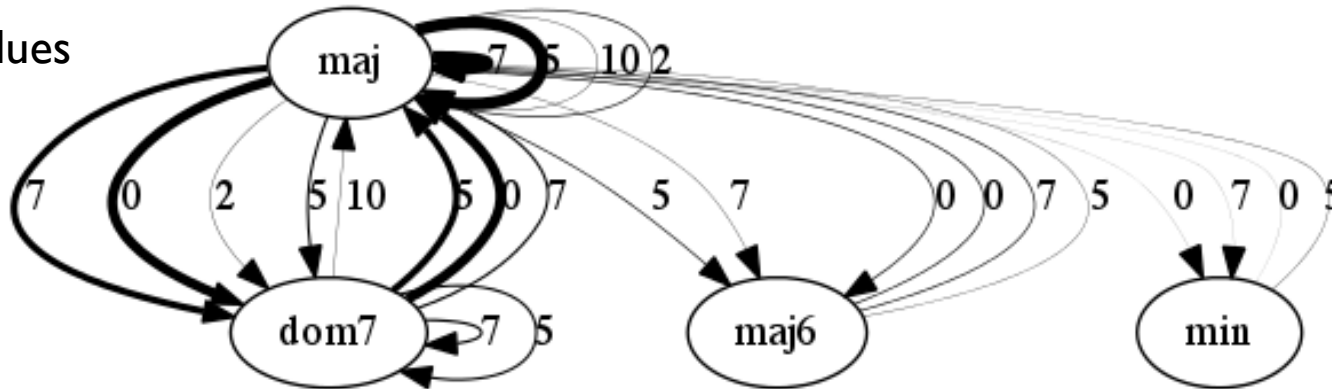
- Bell-shaped curve for all genres
- Jazz and Classical have more patterns: greater harmonic diversity?
- Folk has more long patterns?

# Frequent Chord Patterns: Classical vs. Blues

Classical



Blues



- Classical patterns more distributed
- Blues connects dom7 with dom7, classical doesn't (dom7 is typically resolved to major or minor tonic)

# Visualisation of Chord Sequence Patterns

- ▶ Most prominent chord sequences
- ▶ Compare two collections or visualisations

blues

jazz

up to 1000

most frequent chord sequences (both cyclic and non-cyclic)

up to 100

most frequent non-cyclic chord sequences

linked circular grid

twisted CW

tonnetz

curved lines, more space

