I548 Introduction to Music Informatics

Spring 2011, 3 credits

Instructor: Eric Nichols

Overview:
This course introduces the subject of music informatics. The boundaries of this cross-disciplinary field are hard to define – broadly speaking, it includes most applications of computing technology to the study and performance of music. This course presents a collection of topics of current relevance to researchers in the field, beginning with the analysis of music represented as audio (e.g. CDs and MP3s) and continuing with analysis of music represented symbolically (e.g. MIDI files and sheet music). Next, the course moves into higher-order problems such as music recommendation and music organization and retrieval. Finally, research on human perception and cognition of music is presented as an important tool for music informatics researchers.

Students will be expected to participate in class discussions, to present research papers on selected topics, to implement several music informatics algorithms in code, and to turn in a final individual project on a topic of personal interest.

Tentative Syllabus (subject to change):

1. Intro to music informatics issues
   * What is MIR?
   * Overview of current uses of MIR in the real world

2. Analysis of audio
   * Basic sound synthesis
   * The Fourier transform
   * Monophonic transcription
   * Audio segmentation
   * Polyphonic transcription
   * Searching music databases (audio similarity)
   * Auto-tune

3. Symbolic representation of musical scores
   * From MIDI to Humdrum, MusicXML and beyond)
   * Searching music databases (symbolic similarity)
* Automatic instrument fingering for strings (violin, cello, etc)
* Melody extraction and the melodic streaming problem
* Lead sheet generation
* Relationships between lyrics, melody, and rhythm
* Automatic structure detection (from motifs through higher-level forms)
* Automatic chord generation (Microsoft's MySong)
* Automatic composition (Dave Cope's EMI, Japanese/Cantonese melody generation)

4. Human-assisted MIR
* Metadata and social tagging
* The problem of genre
* Automatic music recommendation
* Song clustering
* Visualization of large music collections

5. Music perception and cognition, and implications for MIR
* Perceptual coding and mp3/ogg
* Povel and Essens: induced clocks
  Application: Beat detection
* Narmour's I-R theory
  Application: Melodic expectation generation
* Musicat: a model of musical listening