INFO I547: Music Information Processing: Audio

Spring 2008

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Classes  TR 11:15 – 12:30 Informatics 105

Office  Informatics 315  856-1849

Office Hours  MW 4-5 and by appt.

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Course Web page  http://www.music.informatics.indiana.edu/courses/I547

Course Material
This course deals with various music analysis and processing problems that use sampled audio as the primary data representation. We discuss digital signal processing including filtering and its relationship to Fourier techniques. We will focus on applications including score following (online and offline), automatic music transcription and annotation from audio, musical accompaniment systems, as well as some useful audio effects. The class is open to all graduate students, but students should be prepared for some mathematics, computer science and statistics.

Homework  There will be homework assignments consisting primarily of computing exercises in R with applications to various aspects of digital audio processing and music analysis. R is a free program that can be downloaded for various platforms from http://cran.r-project.org/

Grading  Grading will be based on homework assignments and a final exam or final project — to be determined.
Course Material

1. Digital Audio
   (a) Digital Audio Basics
   (b) Fourier Transforms
   (c) Spectrograms and STFT

2. Pitch and Periodicity
   (a) Sine Waves
   (b) Intervals
   (c) Musical Timbre or Tone Color
   (d) Beats and Aliasing

3. Filtering and Effects
   (a) Convolution and Filtering
   (b) Time-Stretching
   (c) Special Effects

4. Score Following
   (a) Off-line Following
   (b) On-line Following
   (c) Musical Accompaniment Systems

5. Recognition of Musical Audio
   (a) Pitch and Chord Recognition
   (b) Harmonic Content from Audio
   (c) Monophonic Instrumental and Singing Recognition
   (d) Polyphonic Recognition

6. Instrument Analysis from Audio
   (a) Tracking Musical Parameters (Dynamics, Pitch)
   (b) Instrument Classification