INFO I546: Music Information Processing: Symbolic

Fall 2009

Instructor  C. Raphael (craphael@indiana.edu)

Classes  TR 1:00 – 2:15 Music Library 340

Office  Informatics 315  856-1849

Office Hours  MW 4:00-5:00 and by appt.

Web Page  http://www.music.informatics.indiana.edu/courses/I546/

Course Material
This course deals with the algorithmic annotation, understanding, recognition, visualization, and
categorization of music in symbolic (score-like) form, as well as methodology to accomplish these
tasks. Particular applications will be taken from key finding, harmonic analysis, note spelling,
rhythm recognition, expressive melody synthesis, meter induction, instrument fingering, melody
morphing, and various classification problems such as genre or composer identification. The method-
ology we will employ will be probabilistic and will include ideas from machine learning such as opti-
mal classifiers and hidden Markov models. Students will have computing assignments in R (similar
to Matlab) and will occasionally present solutions. We will employ the “learn by doing” method
throughout the course. The course will be supported by readings of various papers and tutorials,
as well as a set of notes class that that appear on the course web page.

Prerequisites  While we will make little or no use of calculus itself, the level of mathematical so-
phistication is roughly equivalent to one year of college-level calculus. A wide variety of different
classes may satisfy this prerequisite. Students should have some experience with some variety of
programming, as well as significant interest and practical experience with some aspect of music
such as performance, composition or theory. This course tends to attract students with diverse
backgrounds. If you are wondering if this course is appropriate for you, please discuss the matter
with me.

Computing
The program R can be downloaded from
http://cran.r-project.org/
for Windows, MacOS and Linux platforms.

Homework  There will be regular homework assignments consisting primarily of computing exercises
in R with applications to various aspects of music analysis.

Grading

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>50 %</td>
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<tr>
<td>Class Participation</td>
<td>25 %</td>
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<td>Final Project</td>
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1. Music as Data: Exploratory Data Analysis and Visualization
   (a) Pitch and Length Distributions
   (b) Composer or Genre Scatterplots
   (c) Tempo Curves

2. Probabilistic Classification
   (a) Basic Probability
   (b) Bayes Classifiers

3. Music Classification (“Bag of Notes” Model)
   (a) Key Recognition
   (b) Meter Analysis and Entropy
   (c) Composer/Genre Classification

4. Sequence-Based Music Analysis
   (a) Dynamic Programming
      i. Instrumental Fingering
      ii. Automatic Voice leading
   (b) Markov Chains and Hidden Markov Models
   (c) Harmonic Parsing
   (d) Expressive Synthesis of Melody
   (e) Melody Morphing and Music Generation

5. Analysis of Musical Timing
   (a) Tempo following (known rhythm)
   (b) Rhythm Recognition and Ockam’s Razor
   (c) Modeling Rhythmic Expression